Walkabout: An Easy to Use, Experiential Learning Activity for Applying Abstract Concepts to the Real-World

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Abstract

Students can have difficulty recognizing examples of course concepts in the real-world. They particularly struggle with phenomena that are ambiguously defined, have mimics, or are hard to distinguish from other phenomena. Students can better explore and understand these phenomena in situ. Unfortunately, short class periods, students’ full schedules, and limited resources hinder classic fieldtrips. So, I created Walkabout, which gives students experiences observing and analyzing in situ phenomenon in the surrounding environment during class periods. Walkabout aligns with elements of active learning, experiential learning, and adventure education. In Walkabout, students learn about and discuss the key characteristics of a concept or phenomenon using pre-class readings, reading responses, and class discussion of classic examples. Then, students leave the learning space to walk outside, identify, and photograph examples of the phenomenon. They return to the classroom or online learning space having selected their best example, which they present to the class and engage in a discussion of how well it represents the phenomenon. This activity can be applied to any course topic that discusses real-world phenomena that are easily observable in the environment surrounding the learners but are difficult to identify or define. Instructors can use it with in-person or online classes, synchronously or asynchronously, and in high-tech, low-tech, and no-tech learning environments. Walkabout helps to scaffold student learning, allows students to practice applying difficult concepts, and creates a more inclusive learning environment. It energizes students, helps them learn from each other, and keeps them engaged and focused in a way they enjoy.

INTRODUCTION

Students often struggle to find relevancy in course concepts and to apply them to the real-world (1). This is reflected in students’ poor abilities to transfer knowledge to new or more complex situations or solve novel problems (2). These struggles are especially evident when students are learning about phenomena that are abstract, difficult to identify, loosely defined, or identified through the verification of multiple characteristics. For example, students may struggle to identify trees in a winter dendrology course or distinguish between mimics in an ecology course, because it requires identifying a species through a process of elimination by looking for a specific constellation of common characteristics. Some of these difficult to identify or classify phenomena, such as climate change impacts and mitigation measures or socio-cultural characteristics of environmental technology, are not things that can easily be brought into the classroom to observe. Rather, students can better explore and understand these phenomena in situ in outdoor learning environments (3–5). Unfortunately, short class periods, students’ full schedules, and limited resources (e.g., time, transportation, funding, logistics) hinder professors in providing classic fieldtrips (6–8).

To address this, I created an activity called Walkabout that gives students guided experiences observing and analyzing in situ phenomenon during class periods. Walkabout leverages the campus grounds and surrounding areas for exploration and learning, offering learning benefits beyond in-classroom instruction and responding to the call for formal educators to remove barriers between students and the outdoors (3–5, 8). In Walkabout, students first learn about and discuss the key characteristics of a concept or phenomenon using pre-class readings, reading responses, and class discussion of classic examples. Then, students leave the classroom or online learning space to walk outside, identify, and photograph examples of the phenomenon. They return to the classroom or online learning space having selected their best example, which they present to the class and engage in a discussion of how well it represents the phenomenon.

This activity can be applied to any course topic that discusses real-world phenomena that are easily observable in the environment surrounding the learners but are difficult to identify or define. For example, I have a colleague who has used Walkabout in a 300-level university course on marine diversity and conservation to aid students in identifying ways that they mitigate climate change in their daily lives.

Walkabout draws on the benefits of experiential learning, adventure education, and active learning. Experiential learning is a process by which students learn by doing, then reflect on the experience to develop new knowledge and skills (4). Examples of experiential learning are internships, service learning, practicums, field work, study abroad and field trips. However, these classic examples are time and resource intensive. There
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are also experiential learning activities being used on more convenient campus field trips to study aspects of bureaucracy at the registrar’s office or the criminal justice system at the campus police station (8). But these examples of on-campus field trips lack detailed information on how to implement them as part of a curriculum. Walkabout offers an experiential learning option that can be done during a class period and on campus grounds. Walkabout also aligns with Kolb’s Experiential Learning Cycle, which is a four-stage process of concrete experience, reflective observation, abstract conceptualization, and active experimentation (Figure 1) (9). A concrete experience is when a student is personally engaged in a new situation or reevaluating a previous experience in light of new concepts. Reflective observation occurs when the student ponders the experience and relates it to their existing knowledge, thoughts and feelings. In abstract conceptualization, the student uses theories and generalizations to generate new ideas or modify abstract concepts. With active experimentation, the student applies these new ideas to different situations and observes the outcomes.

Kolb’s Experiential Learning Cycle can be entered at any point. In the case of Walkabout, it begins and ends at the abstract conceptualization stage (Figure 1). Students begin by learning about an abstract concept and relating it to their past experience. The instructor then leads a series of activities for them to explore and consider this concept through mental experimentation probing their own experiences and those of their classmates. They then go out into the school grounds to find, discuss, and photograph examples of the concept. And finally, they refine their abstract conceptualization through presentation, defense, and group discussion of their best example of the concept.

Walkabout provides real-world context and increases relevancy through adventure education. Adventure education involves an educational activity that occurs outdoors and leverages this setting for learning. Adventure education can increase the relevancy of STEM lessons by providing immediate opportunities to practice and apply the lesson. By increasing relevancy, this can lead to greater engagement, and improved learning outcomes (6). Importantly, relevancy extends beyond students’ interests to address individual, societal, and vocational needs (1). My use of Walkabouts aligns with adventure education and increased relevancy by giving students outdoor practice in identifying environmental technologies and discussing examples of the socio-cultural characteristics of technology, such as power, politics, and culture. Workabout is a simple and easy to apply outdoor learning activity. There are existing outdoor adventure learning activities that share similarities with Walkabout, for instance a draw and explain tool to assess understanding of a river delta (4), and phenomenology lessons to identify seasonal changes in the landscape (6). However, these activities occur in the context of resource-intensive fieldtrips.

Walkabout also provides context, which can aid students to apply abstract STEM concepts to everyday life and societal issues (2). For context-based curriculums to be successful they should employ contexts that are commonly encountered, lend themselves to building coherent mental-maps, increase the likelihood of knowledge transfer, and promote student ownership and engagement with the learning experience. One successful approach to context-based curriculum this is to ground the learning of an abstract concept into a physical setting while providing a socio-cultural perspective on the concept (2). Walkabout aligns with this model of building context, by linking the abstract STEM concept of socio-cultural characteristics of environmental technology to the commonly encountered physical setting of the outdoor environment around the classroom.

Active Learning activities are “exercises in which students do something (e.g., writing, discussing, solving, or reflecting), rather than passively listening to a lecture” (10). There are increasing calls for STEM courses to include active learning, because it can improve student performance and help close the achievement gap for historically minoritized students (11–13). (See Active Learning section below for more detail on how this teaching tool aligns with aspects of active learning.) Like many other active learning activities (e.g., think-pair-share, minute papers, debates, role play), Walkabout is intuitive and simple to understand (13).

Among active learning activities, to my knowledge Walkabout is unique. While, I have found nothing quite like Walkabout in terms of structure, application, and learning objectives, there are a couple of active learning activities with the same name. There is a for-profit educational platform that creates “walkabouts” for elementary students. In this context walkabouts are just kinesthetic activities that include any type of body movement, e.g., skipping or raising a hand. The activities are only loosely linked to a specific class topic and are mostly intended to get students moving. There is also an active learning activity called City as Text™. This holds more similarities to the walkabout activity described here, in that students are moving through the real-world and making observations. City as Text™ sends students out into the city for a 4–5-hour exploration. Guided by a question sheet, students get to know the geography, culture, and other essential information about local people and ways of living in a specific city neighborhood (14). Walkabout as described in this CourseSource article differs from City as Text™, in that I developed Walkabout for students in higher education and it equips and focuses students to identify examples of just one phenomenon. Students must also reach beyond just reporting what they have seen, and rather be able to defend their classification of a phenomenon and compare how well it aligns it with the definition or suite of identifying characteristics.
COURSE DESCRIPTION

While this activity could be useful in many STEM courses, I used this activity at a large research university in an undergraduate course called Innovation in Society. This course has a mix of majors and non-majors. Many of the students were in their equivalent of sophomore or junior years and were taking the course to satisfy a general education requirement. I use Walkabout when teaching a unit consisting of four 75-minute class sessions. It is a formative assessment activity that I use in each lesson. The activity alone takes 30 minutes. In the unit, I teach that technology can have power (e.g., traffic lights have the power to govern movement of people driving cars) (lesson 1), culture (e.g., structure of toilets such as squat toilets and bidets) (lesson 2), and politics (e.g., design of streets and stairways to inhibit rioting) (lesson 3), and then apply these concepts to broaden students’ understanding of green (i.e., environmental) technology (lesson 4) (Supporting File S1). I discuss green technology within the context of marine conservation and how technology can help protect imperiled species. I discuss how electronic monitoring technology has power to cite fishing violations, how local shrimpers reinvented turtle excluder devices to align with their cultural norms and needs, and how international fisheries agreements, which often stipulate fishing gear requirements, are inherently political. If teaching these topics, several open access readings are helpful (15–17). Additional primary literature is also helpful (18, 19).

ACTIVITY DESCRIPTION

I prepare students for the walkabout activity with pre-class assignments and in-class activities (Table 1). I use this activity as part of a flipped classroom (20), so students are expected to have read about the class topic and submitted a one-paragraph reading response. The reading familiarizes the students with the topic of the day (in this case, environmental and green technologies like bycatch reduction devices) and some classic examples of the topic (e.g., solar energy panels, electric cars, circle hooks, turtle excluder devices). Students should come to class with a basic understanding of the topic. The topic should be a locally observable but difficult to identify or classify phenomenon, e.g., types of green technologies and how they can be misused to cause environmental harm.

In class, I have students do a think-pair-share (21) to define green technology in their own words based on the pre-class reading. Then, through mini-lectures and class discussion we recount and consider the examples of green technologies from the reading (e.g., weak hooks, pingers, circle hooks, Ruhle trawl). Next, I ask students to brainstorm a list of green technologies that I record on the board. As a group we work through the more difficult examples on the list, discussing what characteristics make them green technologies and also ways they can be misused to cause environmental harm. For example, rollers can be used for habitat conservation or can cause habitat damage. Rollers were invented for use on trawl nets. Trawl nets drag along the bottom of the ocean floor and can damage ocean floor structure and organisms. Rollers are wheels that lift the net slightly off the ocean bottom, reducing the amount of fishing gear touching the bottom and minimizing habitat damage. However, some fishers realized that using rollers would allow them to fish in rocky habitat areas that they could not access in the past because the rocks destroyed their nets. When rollers are used in these previously un-trawled areas, they are increasing habitat damage caused by fishing, not decreasing it.

With this preparation of defining, identifying, and defending examples, I have students do the Walkabout. I instruct the students to leave the classroom in pairs and explore the campus looking for and taking photos with their cellphones of examples of the phenomenon discussed in class (e.g., green technologies). If the area surrounding the classroom has many examples of green technologies (solar panels, electric cars, low flow toilets, water recycling system), then I challenge the students to find examples of green technologies that can be used for both the benefit and detriment of the environment, organisms, or habitat. I instruct each pair of students to discuss, compare their photos and select one that each pair believes is the best example they found. After 15 minutes of walking and exploring, the pairs should return to the classroom prepared to explain why this is the best example by drawing on concepts from the pre-class reading, class discussion, and their own reasoning. I then ask for volunteers to share and explain their example. I prompt the full class to be thought partners with the presenting pair by supplying additional reasoning to support their example.

For a more advanced discussion, the presenters can also identify ways that their example does not align well with the definition of a phenomenon (e.g., how a green technology can harm the environment). An example that might arise from an in-person class is a photo of a recycle bin that is full of garbage, because the bin was not well labeled or not accompanied by suitable trash bins. The students might explain that if too much garbage is mixed with recyclable items, it would be considered contaminated and everything would be sent to the landfill. Thus, instead of helping the environment, these recycling bins contribute to the waste problem.

TEACHING DISCUSSION

As an instructor, I perceive that students react well to Walkabout and the associated preparatory activities. I perceive that students return to class energized and ready to share, and that they seem engaged and enjoy the activity. This enthusiasm may be due to an increase sense of relevancy of the lesson topic as a result of hands-on, practical experience (6, 22). It also could be related to the context-based learning and opportunities for student ownership by finding and photographing their own examples of environmental technologies (2).

Walkabout facilitates students learning from each other by scaffolding learning, practicing applying concepts to the real world, and explaining key concepts. The potential benefits to students include helping them to process new knowledge, apply it to thinking about a phenomenon in new ways, and practice transferring it to novel problems and situations (2, 4, 22). It also promotes evaluation and communication skills as a result of the collaborative identification, class presentation, and group discussion (23, 24). Furthermore, my specific use of Walkabout for learning about the socio-cultural characteristics of environmental technology aligns with a socio-scientific,
issues-centered approach to STEM education. This allows for value-centered learning and can help students to learn about the intersections of science and society, while practicing debate and decision-making skills (1, 23).

Given the potential benefits to students, it is important to keep the discussion student-centered (13). The instructor should strive to hold their own comments until the end of the class discussion of each example. At this time, the instructor should reinforce accurate observations and build confidence by highlighting the key points the presenters and the class have made. If possible, explicitly name and credit the individual who made each point. The instructor should also relate the example to key points from the pre-class reading or class discussion that the students have not yet mentioned.

If time allows, the instructor can expand the class discussion of pairs’ examples beyond how it aligns with the definition/description of the phenomenon to discuss ways the example is misaligned. However, this should remain a positive and edifying experience for the presenting students and the instructor should remind the class, if needed, that no example is perfect. If the local environment does not offer many examples of green technology or whatever topic is being taught, then students can search online for photos of items they believe are good examples of green technology. If students are not constrained to the local environment, then they may produce more sophisticated examples, such as a nuclear power plant. The students might explain that nuclear power does not use fossil fuels so it does not contribute to climate change, but it produces toxic by-products that can contaminate the environment.

To aptly use Walkabout, instructors should be prepared to demonstrate the activity and facilitate student’s understanding of the target concept by presenting photos of classic and ideal examples of the phenomenon. What students encounter may be less than ideal examples, and so the instructor should be prepared to discuss how these examples do and do not fit the archetype of the phenomenon. Instructors also should identify some examples that students are likely to encounter on their walkabout around campus or in their neighborhoods. Instructors should be prepared to share these if students do not present these specific examples during the Walkabout activity.

With a few adjustments, Walkabout works well in online classes and is an excellent way to encourage online students to interact with their local environment. In an online class, students will work independently to identify and photograph examples. To aid photo sharing in both in-person or online classes, the instructor can use padlet.com. Padlet is an excellent free online platform that allows students to post photos and comments in response to a prompt (25, 26).

Instructors can use Walkabout in low technology learning environments. Consider having loaner devices available for students without a cell phone. Any device that can take and display photos is fine. An ideal loaner device would be an old cellphone with Wi-Fi capability, because a wireless carrier is not needed for this activity. If students do not have ready access to Wi-Fi in the classroom, another alternative for sharing images with in-person classes would be to use a document projector.

If digital infrastructure does not support any use of technology, students can record and share their observations with rich written descriptions or drawings. If using this option, encourage students to identify exactly where they observed the technology. Describe its color, size, texture, sound, etc. If it is a common phenomenon that they are observing, have them identify if there was anything unexpected in the appearance or activity of the phenomenon.

**SCIENTIFIC TEACHING THEMES**

**Active Learning**

The Walkabout itself is an active learning activity (10–12). Students move through their surrounding environment, while making, categorizing, and documenting observations. They work collaboratively to identify exemplars of a phenomenon and to construct a supported argument to defend their identification. The preparation for the Walkabout can also include active learning activities such as think-pair-share (21), brainstorming (27), and group discussion (13).

**Assessment**

Walkabout can be a formative assessment (28) for evaluating learning. When used in class as part of the lesson, it allows the instructor to evaluate how well students can identify, discuss and defend examples of complex phenomena. The instructor should base the formative assessment on the definition, description, and characteristics of the phenomenon that were identified in the pre-class reading and class discussion. The instructor should assess for when characteristics in a student’s example have been misidentified, misinterpreted, or missed in general. When giving feedback during formative assessment, the instructor should be sure to reference the relevant aspects of the definition, description, or characteristics of the phenomenon.

The instructor can also use Walkabout as part of an exam review class session, and it works especially well for online synchronous or asynchronous classes. For the exam review, the instructor can prompt students to post a photo or just name an example of the phenomenon and write one or two sentences supporting this designation. If using padlet.com (25, 26), students can then review the responses of their classmates and upvote the best ones. This use of padlet.com allows for two levels of formative assessment: (i) students’ ability to show their understanding through original examples and (ii) students’ ability to recognize good examples and explanations of the phenomena. If students can recognize good examples when offered but struggle to identify their own original example, this may indicate that students need more scaffolding, support, or practice with applying their understanding of a concept to the real world. When used as a formative assessment, Walkabout also allows instructors to find learning gaps and give targeted just-in-time lectures and additional practice.

In the context of identifying green technologies (15, 19), instructors can measure student achievement of learning goals with several approaches. Students’ reading responses (29), think-pair-share (21), brainstorming (27), and class discussion (13) all allow for formative assessment and practice of defining green technology and identifying, describing, and explaining examples of green technology. Summative assessments (28) can include multiple choice, matching, and short answer.
questions. Instructors can use multiple choice questions to assess if students know key defining characteristics of a phenomenon. Matching questions allows students to prove their knowledge of classic examples of different related phenomena. These are typically examples drawn from the readings and class discussion, e.g., a wind turbine would be matched as an example of green technology and turtle excluder devices would be matched as an example of marine conservation technology. Instructors can use short answer questions to assess students’ ability to identify real world examples and give a reasoned support for this. One such question might be, “Name a green technology that can be used for both the benefit and detriment of the environment. How is it used in these different ways?”

Inclusive Teaching

Walkabout and the associated preparatory activities fulfill seven guidelines and twelve checkpoints for Universal Design for Learning (UDL), making it an inclusive activity (Table 2). UDL is a framework with guidelines “to improve and optimize teaching and learning for all people based on scientific insights into how humans learn” (30). UDL aims to (i) provide multiple means of engagement to stimulate interest and motivate learning, (ii) present information and content in different ways, and (iii) provide various ways for students to express what they know. Educators can fulfill these goals in their teaching by applying some or all nine guidelines on increasing students’ options for: recruiting interest, sustaining effort and persistence, self-regulation, perception, language and symbols, comprehension, physical action, expression and communication, and executive functions. These nine guidelines are further subdivided into a total of 31 checkpoints, which are general examples of ways to fulfill a guideline.

Depending on circumstances, there are adaptations that can make Walkabouts further inclusive. If weather conditions, accessibility, or required permissions preclude some or all students from leaving the building or classroom, encourage students to make observations through the windows. Alternatively, students can take a mental journey through areas they regularly travel and think about green technologies they typically encounter. The students can then share the examples they think of with their partner and look for photos of this technology online.

SUPPORTING MATERIALS

• S1. Green Technology – Lesson Plan

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REFERENCES


Table 1. Activity timeline. The activity requires thirty minutes of class time. A pre-class reading assignment and response prepares students with basic knowledge of the topic.

<table>
<thead>
<tr>
<th>Activity</th>
<th>Description</th>
<th>Estimated Time</th>
<th>Notes</th>
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<tbody>
<tr>
<td>Preparation for Class</td>
<td></td>
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<tr>
<td>Pre-Class Reading</td>
<td>An accessibly written news or popular science article about the phenomenon.</td>
<td>15 minutes</td>
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<td></td>
<td>Ideally, it should have several strong examples with rich descriptions.</td>
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<tr>
<td>Reading Response</td>
<td>Students submit responses to this prompt: “Summarize the main topic of this reading. Include an example that this reading uses to explain the topic. Include an example from your own observations of the world and explain how it also illustrates the topic.”</td>
<td>15 minutes</td>
<td>Responses can be submitted via a learning management system like Canvas or as a paper submission.</td>
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<tr>
<td>Walkabout Activity</td>
<td></td>
<td></td>
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<tr>
<td>Walkabout Observations</td>
<td>Students walk around campus or a field site looking for examples of the phenomenon.</td>
<td>15 minutes</td>
<td>Inside or online searches are also options if accessibility is an issue.</td>
</tr>
<tr>
<td>Walkabout Discussion</td>
<td>Students return to class and present and discuss their examples.</td>
<td>15 minutes</td>
<td>Padlet.com (a free resource) can aid with photo sharing.</td>
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</tbody>
</table>
Table 2. UDL framework fulfillment. Walkabout includes inclusive teaching practices by aligning with and fulfilling twelve checkpoints in the Universal Design for Learning Framework.

<table>
<thead>
<tr>
<th>UDL Guideline</th>
<th>Checkpoint</th>
<th>How Fulfilled</th>
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<tbody>
<tr>
<td>G2: Provide options for language &amp; symbols</td>
<td>2.5 Illustrate through multiple media</td>
<td>Presents key concepts in a form of symbolic representation (e.g., an expository text) with an alternative form (e.g., photos)</td>
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<tr>
<td>G3: Provide options for comprehension</td>
<td>3.2 Highlight patterns, critical features, big ideas, and relationships</td>
<td>Uses multiple examples and non-examples to emphasize critical features</td>
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<td></td>
<td>3.4 Maximize transfer and generalization</td>
<td>Incorporates explicit opportunities for review and practice</td>
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<td>Embeds new ideas in familiar ideas and contexts (e.g., photos)</td>
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<td>Provides explicit, supported opportunities to generalize learning to new situations (e.g., finding examples around campus)</td>
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<tr>
<td>G4: Provide options for physical action</td>
<td>4.1 Vary the methods for response and navigation</td>
<td>Provides alternatives for physically interacting with materials (e.g., take photos)</td>
</tr>
<tr>
<td>G5: Provide options for expression &amp; communication</td>
<td>5.1 Use multiple media for communication</td>
<td>Compose in multiple media (e.g., photo and oral explanation)</td>
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<td></td>
<td>5.2 Use multiple tools for construction and composition</td>
<td>Current media tools provide a more flexible and accessible toolkit with which learners can more successfully take part in their learning and articulate what they know (e.g., photo, oral, and written explanation)</td>
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<td>5.3 Build fluencies with graduated levels of support for practice and performance</td>
<td>Provides multiple examples moving from those identified by an authority source, to identified by the class, to identified by pairs</td>
</tr>
<tr>
<td>G6: Provide options for executive functions</td>
<td>6.2 Support planning and strategy development</td>
<td>Embed prompts to “show and explain your work” (e.g., pairs sharing and defending example with the class)</td>
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<td>6.4 Enhance capacity for monitoring progress</td>
<td>Provides formative feedback that allows learners to monitor their own progress effectively and to use that information to guide their own effort and practice. Uses multiple examples of annotated student work (e.g., instructor feedback during group discussion of examples and after pair presentations)</td>
</tr>
<tr>
<td>G7: Provide options for recruiting interest</td>
<td>7.2 Optimize relevance, value, and authenticity</td>
<td>Activities reflect a purpose that is clear to the participants. Tasks allow for active participation, exploration and experimentation (e.g., walkabout)</td>
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<td>Invite personal response, evaluation and self-reflection to content and activities (e.g., reading response, think-pair-share)</td>
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<td>G8: Provide options for sustaining effort &amp; persistence</td>
<td>8.3 Foster collaboration and community</td>
<td>Encourage and support opportunities for peer interactions and supports (e.g., think-pair-share, brainstorming, class discussion, walkabout pairs, and class thought-partnering during pair presentations)</td>
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<td>8.4 Increase mastery-oriented feedback</td>
<td>Provides feedback that is substantive and informative rather than comparative or competitive. Feedback models how to incorporate evaluation, including identifying patterns of errors and wrong answers, into positive strategies for future success (e.g., instructor feedback on brainstorming, pair presentations, and exam review formative assessments)</td>
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