Developing Effective MWEEs: Common Challenges and How to Address Them
Contents

Developing Effective MWEEs: Common Challenges and How to Address Them ............... 3
Challenges to Effective MWEE Design and Implementation................................................... 4

Background: The Chesapeake Bay Program, the Chesapeake Bay Watershed Agreement, B-WET, and MWEE. ........................................................................................................... 5

♦ Challenge 1: Establishing Curricular Connections ........................................................... 6

Background: What are academic standards? ...................................................................... 6
Background: Why should MWEEs support standards-based learning? ............................... 7
Background: What is meant by “curriculum scope and sequence?” Why is it important for MWEE development teams to consider curriculum scope and sequence? ...................... 7
Background: What are the roles of school district partners? ................................................ 8

Strategies for Minimizing or Avoiding this Challenge ........................................................... 9
Additional Resources .........................................................................................................10

♦ Challenge 2: Supporting 21st Century Student Learning ...............................................10

Background: What is the “New Vision” for 21st Century Learning? .....................................11
Background: How do MWEEs support 21st Century student learning? ...............................11

Strategies for Minimizing or Avoiding this Challenge ..........................................................13
Additional Resources .........................................................................................................14

♦ Challenge 3: Designing Effective Outdoor Field Experiences .....................................14

Background: How do outdoor field experiences enhance the MWEE? ...............................15
Background: What are some of the obstacles to implementing Outdoor Field Experiences? ..........................................................................................................................................15

Strategies for Minimizing or Avoiding this Challenge ..........................................................16
Additional Resources .........................................................................................................16

♦ Challenge 4: Planning Student-driven Action Projects ...............................................17

Background: What is stewardship? What leads to the development of stewardship attitudes and behavior? ....................................................................................................................17

Strategies for Minimizing or Avoiding this Challenge ..........................................................19
Additional Resources .........................................................................................................19

♦ Challenge 5: Providing Effective Teacher Professional Learning ..................................19

Background: What is teacher professional learning and how can it benefit a MWEE program? ...........................................................................................................................................20
Background: How do we identify, acknowledge, and address barriers to MWEE implementation? ................................................................. 22

Background: What are effective models for teacher professional learning programs? ...... 22

Strategies for Minimizing or Avoiding this Challenge .......................................................... 23

♦ Challenge 6: Effectively Capturing Affect and Attitude ................................................. 23

Background: How can I demonstrate the added value of my MWEE regarding the impact on affect and/or attitude? ........................................................... 24

Strategies for Minimizing or Avoiding this Challenge .......................................................... 24

Conclusion .............................................................................................................................. 24

Appendix A: Developing Goals, Objective, and Outcomes that Reflect Key Strategies .... 26

Comprehensive Example ................................................................................................... 26

References .............................................................................................................................. 29
Developing Effective MWEEs: Common Challenges and How to Address Them

Meaningful Watershed Educational Experiences (MWEEs, pronounced “mee-wee”) represent rigorous, student-centered, inquiry-based approaches to instruction that are designed to support student environmental literacy and stewardship.

This report reflects lessons learned from the comprehensive review and analysis of the evaluation reports from MWEEs that have been funded by the Bay Watershed Education and Training (B-WET) Chesapeake grant program. While some of the recommendations for best practices in this guide will be relevant to MWEEs that will be implemented at the classroom level, this document intends to support the design and implementation of systemic, sustainable, and student-centered MWEEs that will be integrated into academic programs at the level of the entire school district.

MWEEs are considered systemic when they target all students and teachers in a given grade level or course across the school district. They are sustainable if students and teachers in those targeted grade levels or courses are able to continue to experience and benefit from the MWEE beyond the grant period. A student-centered approach is essential for the long-term outcomes of informed and active stewardship that MWEEs strive to achieve.

This report outlines six challenges to designing and implementing MWEEs according to goals set forth by the Chesapeake Bay Program and B-Wet that are commonly observed or reported in MWEE program evaluation reports. The explanation of each challenge is accompanied by background information relevant to understanding the challenge as well as a series of recommended strategies or “tips” for minimizing or avoiding the challenge during the MWEE development process. Finally, where appropriate, a list of tools and resources to support the design and implementation of effective MWEEs, including those developed and promoted by the Chesapeake Bay Program, is included.

The information, strategies, and tips provided in this document, which are based on the successes and missed opportunities of past projects, are intended to complement and support the suite of resources and tools that the Chesapeake Bay Program has provided to MWEE development teams for the design and implementation of effective systemic and sustainable MWEEs.
Challenges to Effective MWEE Design and Implementation

The following are commonly observed challenges for designing and implementing effective systemic and sustainable MWEEs:

**Challenge 1: Establishing Curricular Connections.** The Chesapeake Bay Program recommends that MWEEs be anchored to curriculum standards and that they are integrated into the scope and sequence of targeted academic programs. Effective MWEE programs establish these connections in the early phases of the development process and use them to shape the MWEE design and implementation.

**Challenge 2: Supporting 21st Century Student Learning.** The Chesapeake Bay Program recommends that MWEEs support contemporary goals for learning and student achievement in the 21st Century. Effective MWEE programs demonstrate the value of the MWEE for actively engaging students in experiences that help them to develop conceptual understandings of core ideas and concepts.

**Challenge 3: Designing Effective Outdoor Field Experiences.** The Chesapeake Bay Program recommends that students participate in one or more outdoor field experiences sufficient to investigate the issue, problem, or phenomenon. Effective MWEEs provide opportunities for outdoor learning that are student-centered, flexible, and directly connect and support all other MWEE elements.

**Challenge 4: Planning Student-driven Action Projects.** The Chesapeake Bay Program stipulates that MWEE programs should allow students to identify, explore, implement, and evaluate solutions for action that address conclusions and claims drawn through investigation. Effective MWEEs support the development of stewardship and responsible ecological attitudes through student-centered and informed action projects.

**Challenge 5: Providing Effective Teacher Professional Learning.** The Chesapeake Bay Program recognizes that MWEEs depend on teacher facilitation and ongoing support of student learning. Effective MWEE programs include teacher professional learning opportunities that allow teachers to engage in activities and discussion to develop and enhance their professional knowledge and practice to provide high quality, productive, and meaningful learning experiences for their students.

**Challenge 6: Effectively Capturing Affect & Attitude.** The Chesapeake Bay Program promotes MWEEs that are grounded in the context of the local community and culture, which help increase student interest, motivation, and attitudes toward learning and stewardship. Effective MWEEs clearly articulate the intended impact of the program on affect and/or attitude.
and make direct connections to the primary goals of student understanding, citizenship, and/or stewardship.

**Background: The Chesapeake Bay Program, the Chesapeake Bay Watershed Agreement, B-WET, and MWEE.**

The **Chesapeake Bay Program**, a regional partnership that brings together leaders and experts from a vast range of agencies and organizations, works toward a vision of an environmentally and economically sustainable Chesapeake Bay watershed with clean water, abundant life, conserved lands and access to the water, a vibrant cultural heritage, and a diversity of engaged citizens and stakeholders. Through the **Chesapeake Bay Watershed Agreement**, the partners recognize that the long-term success of the Chesapeake Bay restoration efforts depends on the work of individuals and communities living throughout the watershed, and, to that end, they have established an **Environmental Literacy Goal** that seeks to enable students in the region to graduate with the knowledge and skills to act responsibly to protect and restore their local watershed.

**Meaningful Watershed Educational Experiences** (MWEEs, pronounced “mee-wee”) represent the **Student Outcome** of the Environmental Literacy Goal of the 2014 Chesapeake Bay Watershed Agreement. MWEEs work to increase students’ understanding of the watershed through participation in rigorous, inquiry-based instruction. MWEEs promote understanding and stewardship of watersheds and related ocean, coastal, riverine, and estuarine ecosystems through collaborative, student-centered investigations of locally relevant environmental issues, particularly those related to human impacts on Earth’s systems. Students then use the understandings they’ve developed in MWEE investigations to plan, implement, evaluate, and reflect on informed action projects that address these issues. MWEEs thus allow students to gain authentic experience in being responsible, active, citizens and environmental stewards.

The **National Oceanic and Atmospheric Administration (NOAA)** offers a valuable resource for the design and implementation of MWEEs through the **Bay Watershed Education and Training (B-WET)** program. This federal grant program provides competitive funding to support meaningful watershed educational experiences for K–12 audiences. Successful and **effective** MWEEs develop student learning, citizenship, and stewardship systemically and sustainably through student-centered teaching practices.

MWEEs are considered **systemic** when they target all students and teachers in a given grade level or course across the school district. They are **sustainable** if students and teachers in those targeted grade levels or courses are able to continue to experience and benefit from the MWEE

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   [https://www.chesapeakebay.net/what/what_guides_us/watershed_agreement](https://www.chesapeakebay.net/what/what_guides_us/watershed_agreement)

beyond the grant period. A student-centered approach is essential for the long-term outcomes of informed and active stewardship that MWEEs strive to achieve.

MWEEs are intended to be integrated into school instructional programs and their success depends on the support from multiple community stakeholders including district-level curriculum supervisors, administrators, and teachers. They also often benefit from the support of community partners including non-formal education providers, state departments of natural resources, and more. To establish and maintain support, MWEE programs must be designed to clearly and adequately demonstrate their value for supporting academic learning, citizenship, and, stewardship.

♦ Challenge 1: Establishing Curricular Connections

The Chesapeake Bay Program recommends that MWEEs be anchored to curriculum standards and that they are integrated into the scope and sequence of targeted academic programs. Effective MWEE programs establish these connections in the early phases of the development process and use them to shape the MWEE design and implementation.

MWEE projects that do not purposefully and productively connect to established curricular programs are often seen by teachers and other school district partners as being “extra” or unnecessary. This can be true even if teachers recognize and appreciate the intrinsic value of the MWEE, often because MWEEs that aren’t well-connected to curriculum jeopardize the time that teachers are able to spend teaching required content and it becomes difficult for them to “fit in” the MWEE activities and/or to justify their inclusion in instructional programs.

To address this, effective MWEEs are designed from the early stages to be integrated directly into academic programs. In many cases, this means replacing existing units, lessons, or resources designed to teach standards of learning. In other cases, it means modifying existing units, lessons, or resources to align with MWEE goals. School district partners can provide valuable information and support for ensuring effective connections to curriculum.

Background: What are academic standards?

Academic standards are benchmark measures that organize and define what students should understand and be able to do at specified grade levels. School systems use standards to help establish and ensure accountability. In other words, aligning learning outcomes to standards with corresponding assessments hold teachers and schools responsible for what goes on in classrooms. Teachers have a professional responsibility to ensure that their students can meet standards, however, they are goals for learning, they are not explicit instructional strategies. Thus, they give teachers and educators the flexibility to design and implement learning experiences in diverse ways to meet the needs of their students. This means that as long as MWEEs help the teachers ensure students meet academic standards, they may be used as the method of instruction in systemic academic programs.
Background: Why should MWEEs support standards-based learning?

A key goal of **systemic** and **sustainable** Meaningful Watershed Educational Experiences is that they should take place during the standard instructional program and be made available to all students who participate in that program (rather than be an “extra” activity that only a select number of students experience or one that only takes place while there is active support from the B-WET program). MWEE programs should thus be designed such that teachers can easily and effectively implement MWEEs “on their own” (with the support of relevant partners). This means more than developing and/or providing lessons to support outdoor field experiences that may be taught in a classroom setting. It means that MWEEs must align with the preexisting priorities of the instructional programs with which they intend to be integrated and must be able to “fit” easily into the curricular scope and sequence that teachers must follow.

To be successful, MWEEs request (and often **require**) the commitment and investment of teachers and others who share an interest in and responsibility for how academic goals for learning are met within the school day. For example, MWEEs ask teachers to devote instructional time to MWEEs and often require additional planning time, especially when MWEEs include off-site activities. Understandably, learning outcomes are of the utmost priority for schools and a primary responsibility of teachers. Thus, to secure the buy-in from teachers and other school personnel that is critical for high-quality, **sustainable** MWEE implementation, it must be made clear how MWEEs support the **school goals** for academic achievement (for example, by aligning with standards) as well as provider goals for student engagement, stewardship, access to outdoor learning opportunities. Furthermore, it is recommended that MWEE development teams establish how the proposed MWEEs will help teachers and schools achieve learning goals as well as, **if not better than** traditional approaches to teaching and learning with which teachers are likely more familiar and more comfortable. Unfortunately, MWEE programs that rely solely on teachers to make connections between MWEE activities and school priorities without proper support risk the likelihood that MWEE implementation will continue following the grant period.

Background: What is meant by “curriculum scope and sequence?” Why is it important for MWEE development teams to consider curriculum scope and sequence?

“**Scope**” refers to the disciplinary core ideas, concepts, and practices that are addressed by a given curriculum. For example, a middle school life science course might focus on:

- the structure and function of organisms,
- the growth and development of organisms,
- how organisms obtain and use the matter and energy they need to live and grow, and
- how organisms detect, process, and use information about the environment.

Those would be the primary- if not the only- concepts that are to be taught in that course and would be the concepts for which students are required to demonstrate understanding on
curricular assessments. Content that falls outside of that scope, even if it is worthy of study and/or connected to life science, would only be able to fit into the instructional program if its inclusion does not jeopardize the time available for the required concepts.

“Sequence” refers to the progressive order in which the students should and will engage in the disciplinary core ideas, concepts, and practices that are addressed by a given curriculum. Districts and schools offer varying degrees of flexibility regarding curricular sequencing. Some may merely identify the academic quarter (one of four 9-week instructional sections of a school year) in which a portion of a curriculum scope must be taught. Others might dictate the exact week within which certain content standards must be taught.

MWEEs that service school and district priorities and can readily meet the demands of the existing scope and sequence of the targeted curricular program are more likely to be implemented following the grant than those with tenuous or indirect connections to academic priorities. It is therefore extremely beneficial to sustained MWEE implementation if development teams are aware of the curricular scope and sequence within which their MWEE will be taught and that they ensure that the MWEE clearly supports the content that makes up the curricular scope and can take place within the timeframe of the curricular sequence.

Background: What are the roles of school district partners?
Decisions about what is taught and when it is taught are typically made at the school district level. Thus, school district personnel are essential partners for ensuring that systemic MWEEs are integrated into curricular programs that are sustainable over time.

School personnel and/or curriculum experts who are connected to the targeted school districts and/or schools are likely to have fundamental understandings of the standards and learning goals that are being prioritized at particular grade levels and/or within specific courses as well as curricular scope and sequences. Content supervisors (for example, science or social studies supervisors and STEM coordinators) can provide helpful information to support curricular connections such as sharing the academic standards, curricular scope, and curricular sequence of various grade levels. They can advise MWEE development teams on how to design a MWEE to best fit into academic programs to ensure systemic implementation and sustainability. These partners can provide support at the classroom level through coaching and by providing materials and resources. They are also often able to identify and access district-level funding that could be used in support of the MWEE. What’s more, curriculum design and learning experts may be better able to see connections between existing or planned outdoor learning experiences and stewardship projects and academic standards than non-formal providers. MWEE providers should strongly consider consulting with such experts in the planning phase of their MWEE project.

District partners can also provide guidance and recommendations for productively scheduling MWEE activities within the curricular sequence and thus, the school calendar. Outdoor
experiences on the water, for example, might be problematic if the curricular sequence requires the content to be taught exclusively in the winter months. Note that in some cases, scheduling conflicts might be unavoidable, resulting in the outdoor field experiences taking place separately from other MWEE components. It is therefore especially important that strong connections between MWEE elements are a purposeful part of the design process.

Finally, district-level personnel can be strong champions of your MWEE effort, promoting the project internally as well as supporting recruitment.

Consider a MWEE that focuses on the topic of the Eastern Oyster. If the audience for this MWEE is a middle school life science course, the MWEE should frame the oyster content in terms of the life science concepts that make up the scope of that curricular program. For example, the MWEE could explicitly target understandings about how the oyster obtains matter and energy from its surrounding environment, and/or how the oyster detects, processes, and uses information about its environment. If the target audience is an earth science course, the MWEE might focus on the impacts of human activities on the ecosystems in which oyster exists.

If there is flexibility regarding the target audience, knowing the curricular scopes of district programs may help the MWEE developer determine which grade level and/or course might be the most appropriate fit. If human impacts on ecosystems is the desired focus, for instance, the grantee should seek to target courses that include such standards as part of their curricular program. A school district partner, such as a middle school science curriculum coordinator, for example, could help the grantee determine the most appropriate science course for the MWEE and could contribute to the MWEE design to help ensure that the content aligns with the targeted curriculum. The district partner could also help advice the MWEE development teams on productive calendar days to incorporate outdoor field experiences and may be able to provide suggestions for instructional strategies or resources (such as journaling, note-taking) that could help maintain those connections for students as the MWEE progresses throughout the semester or school year.

Strategies for Minimizing or Avoiding this Challenge

- Engage district partners from the beginning phases of development.
- Prioritize connections to academic standards and/or learning objectives in MWEE design, development, and evaluation.
- Clearly outline in project materials how the identified standards and learning objectives connect to audience needs (i.e. school/district priorities).
- Clearly outline in project materials how and where the MWEE will be integrated into the scope and sequence of existing curricular and/or instructional programs.
Additional Resources

Many of the tools in the *Educator’s Guide to Meaningful Watershed Educational Experiences* can help support curricular connections. The “MWEE Think Cloud,” for example, is a graphic organizer that can help MWEE development teams bring learning objectives together with the environmental issues, available resources, and partners, and more. The “Curriculum Anchor” of the *Environmental Literacy Model* planning document can further help MWEE development teams define the learning objectives and curricular connections while also identifying the environmental issue that will serve as the context for learning and the driving question that will guide the MWEE inquiry. The “Developing Driving and Supporting Questions” tool can further work to help make connections between the issue, problem, or phenomenon explored throughout the MWEE, the driving question, the supporting questions, and the standards.

♦ **Challenge 2: Supporting 21st Century Student Learning**

The Chesapeake Bay Program recommends that MWEEs support contemporary goals for learning and student achievement in the 21st Century. Effective MWEE programs demonstrate the value of the MWEE for actively engaging students in experiences that help them to develop conceptual understandings of core ideas and concepts.

When implemented in their fullest sense, MWEEs provide authentic experiences that allow students to engage in the skills and practices of professional science, social studies, and other disciplines as they develop a sophisticated understanding of concepts and core ideas. Many MWEE projects, however, restrict their focus to increasing students’ factual recall or procedure skill and do not take full advantage of the ability of the MWEE to support deep, conceptual learning required for informed citizenship and stewardship in the 21st Century. In situations where these broader benefits are not realized, teachers and administrators may find it difficult to justify including MWEEs (which often require additional resources and new approaches to teaching) into academic programs in the absence of direct support (such as grant funding and technical assistance), and therefore may face challenges in integrating MWEEs as a sustained, systemic part of the curriculum.

Designing MWEEs that support conceptual understandings and disciplinary practices require thoughtful planning, but the benefits to students are worth the investment. Effective MWEEs do this by foregrounding student learning outcomes, emphasizing student sensemaking around conceptual ideas and concepts, and by leveraging opportunities to authentically engage students in disciplinary practices (such as asking questions and defining issues, engaging in argumentation from evidence, planning and conducting investigations, analyzing and interpreting data, and more).
Background: What is the “New Vision” for 21st Century Learning?

Stakeholders in education are increasingly promoting a “new vision” for how students will engage in the knowledge and skills of core disciplines (such as science, engineering, social studies, and mathematics) in order to best prepare for life in the 21st century. This means a shift toward supporting students to learn and apply core ideas and concepts as they make sense of real-world problems and phenomena. It also means engaging students in the practices by which professionals construct knowledge in their fields (as opposed to, for example, learning about the products of professional scientists and engineers).

The National Research Council has identified several specific ways in which the approach to science education should evolve to respond to the demands of life in the 21st Century. For example, the Guide to Implementing the Next Generation Science Standards notes that science education should increasingly involve learning facts and terminology as needed to develop explanations that are supported by evidence-based arguments and reasoning, as opposed to focusing on rote memorization of facts or vocabulary. Furthermore, rather than a focus on teachers or textbooks providing information to students in ways that are disconnected from everyday life, science education will involve students using systems thinking to explain real-world phenomena through investigations, problem-solving, and discussion. The MWEE approach to learning very clearly supports these and other goals of 21st-century learning, including utilizing systems thinking and modeling to explain life-relevant environmental phenomena, developing claims based on evidence collected from a variety of sources, and presenting their findings to audiences outside the classroom.\(^3\)

Additionally, the National Council for Social Studies has published the College, Career, and Civic Life (C3) Framework for Social Studies State Standards. This framework outlines the progressive understandings that students should develop in civics, economics, geography, and history, and further provides guidance for student learning related to communicating conclusions and taking informed action. The MWEE directly supports the dimensions of learning outlined by the C3 Framework and can be particularly helpful in addressing standards for civic action, stewardship, and community service that are required by school districts.

Background: How do MWEEs support 21st Century student learning?

MWEEs offer dynamic and engaging approaches to learning that are most impactful when they go beyond direct instruction and focus on allowing students to engage in authentic sensemaking through meaningful investigations into life-relevant issues and phenomena. MWEEs allow students to learn and apply facts and related vocabulary in the service of understanding life-relevant environmental challenges, issues, or phenomena. Students engage in issues investigations that are driven by their own questions with a range of outcomes that lead to deep,

\(^3\) For more information on the “New Vision” for science education including an infographic on the implications of the vision of the Framework for K-12 Science Education and the Next Generation Science Standards, visit https://www.nextgenscience.org/resources/infographic-how-will-science-education-change-ngss
contextualized understandings of disciplinary ideas, as opposed to relying on textbooks or laboratory procedures that focus on the “right” answers.

Furthermore, MWEEs situate learning in authentic, real-world contexts—many of which are most productively explored outdoors- *in-situ*—for meaningful, life-relevant purposes. MWEEs allow students to see the value of content, activities, and academic tasks by connecting discrete facts and data to situations that are meaningful to themselves and their communities. The contextualized learning experiences of MWEEs allow students to form connections between prior knowledge and new ideas, transfer and apply factual information across multiple contexts, and develop deep conceptual understandings that are critical for academic achievement and success. MWEEs allow students to make observations, collect and analyze data, draw conclusions, and make claims using evidence and reasoning collected during the activities.

Thus, MWEE program goals for student learning should focus on conceptual understandings (rather than focus exclusively on factual detail and mastering procedural skills) to capture the value that MWEEs provide over traditional, and/or textbook-centered instructional approaches. In other words, MWEEs allow opportunities for students to engage in reasoning in which they may use evidence gained from their experiences as they apply disciplinary core ideas to explain natural and observed phenomena. These experiences help students to connect otherwise discrete facts in chains of causal reasoning. For example, it is one thing for a student to identify an example of human activity that can affect water quality, but it is another to apply scientific ideas toward identifying causal relationships between changes in one system and changes in another. The MWEE allows opportunities for students to authentically engage in disciplinary practices in field-based learning environments to test ideas, collect evidence to support claims, and draw conclusions in ways that traditional textbook-centered learning might not.

Thus, MWEE programs should be purposeful in designing and providing experiences that allow students to collect and make sense of authentic evidence as they learn and apply disciplinary core ideas. Furthermore, evaluation instruments can most productively demonstrate the value of MWEEs for impacting student learning if the metrics are structured such that they capture these sophisticated understandings (rather than simplified factual recall that can just as easily be supported through “traditional,” textbook-centered instructional methods).

For example, consider a MWEE that focuses on issues related to agriculture for a unit that focuses on human impacts on ecosystems in a high school ecology course. MWEE developers could demonstrate the unique value of the MWEE experience by prioritizing learning goals that help students to develop conceptual understandings of how and why human activities in agriculture affect Earth systems as well as how communities are using science ideas to minimize these effects. Students could be asked to use evidence collected through MWEE investigations to support conclusions they draw around these ideas, thus demonstrating the MWEE’s impact on student learning in a more substantial and meaningful way than, for example, setting a goal of asking students to recall and identify the major pollutants associated with agricultural activity.
The following represent examples of evaluation questions that support conceptual sense-making grounded in the MWEE experience (in this case, to explain the reasoning behind stewardship-centric activities) compared to questions that require recalling factual information in the absence of critical thinking:

✔ Sample evaluation item that may indicate conceptual sense-making:

On a visit to a farm, you notice that the farmer has put up a wire fence around a stream that runs through the pasture. The farmer tells you she has done this to help minimize the negative impact that the animals on her farm will have on the water quality of the stream and the nearby Chesapeake Bay.

1) How could this action help to minimize the negative impact of the farm on the water quality of the stream and the Bay?
   a. The fence will prevent cows and sheep from entering the stream, which means their urine and feces will not directly contaminate the water.
   b. The fence will prevent polluted water from running off the land and entering the stream.
   c. The fence will prevent the stream from drying up.

2) In the box below, use what you’ve learned [in the name of the MWEE unit] to explain how your answer choice is correct.

3) What is another way that the farmer might minimize the negative impact of her farm on the water quality of the stream and the Bay? Use evidence from [in the name of the MWEE unit] to explain how your answer choice is correct.

✘ Sample evaluation item that may indicate limited factual recall and/or recognition:

1) Of the following, which is considered an example of a human activity that can negatively affect the Bay:
   a) Agricultural run-off
   b) Sediments entering the Bay from new houses being built
   c) Littering
   d) All the above

Strategies for Minimizing or Avoiding this Challenge

- Programs should clearly articulate student learning goals that emphasize student sensemaking around conceptual ideas and concepts (rather than focus exclusively on factual detail and mastering procedural skills).
- Programs should be purposeful in designing and providing opportunities to authentically engage students in disciplinary practices (such as asking questions and defining issues, engaging in argumentation from evidence, planning and conducting investigations, analyzing and interpreting data, and more).
Developing Effective MWEES: Common Challenges and How to Address Them

- Programs should be purposeful in designing and providing experiences from which students can learn and apply disciplinary core ideas as they generate evidence to support conclusions and claims.

Additional Resources

*An Educator’s Guide to Meaningful Watershed Educational Experiences* provides helpful information on understanding the MWEE as an educational tool that
- Increases Students Engagement and Enthusiasm for Learning,
- Supports Student Achievement,
- Advances 21st Century Skills, and
- Promotes Environmental Stewardship and Civic Responsibility.

Furthermore, the MWEE Driving Question can be a productive tool for both guiding investigations and communicating ways that the MWEE activities meaningfully support student learning. The Driving Question is a broad, open-ended, life-relevant question that directly connects to standards and learning objectives. As with designing MWEEs that establish curricular connections (Strategy 1), the “Curriculum Anchor” of the Environmental Literacy Model planning document and the “Developing Driving and Supporting Questions” tool in *An Educator’s Guide to Meaningful Watershed Educational Experiences* guide the development of driving questions that reflect student learning outcomes.

♦ Challenge 3: Designing Effective Outdoor Field Experiences

The Chesapeake Bay Program recommends that students participate in one or more outdoor field experiences sufficient to investigate the issue, problem, or phenomenon. Effective MWEEs provide opportunities for outdoor learning that are student-centered, flexible, and directly connect and support all other MWEE elements.

Often MWEE development teams focus on designing dynamic outdoor learning activities but neglect to include direct and clear connections between these experiences and the other elements of the MWEE (including formal student learning outcomes). Furthermore, MWEEs that limit the outdoor field experience to an offsite activity (often referred to as field trips) that rely on external providers and additional funding (for example, transportation costs) may minimize the role of outdoor experiences in allowing students to engage in disciplinary practices in authentic contexts. They also become difficult to sustain long-term.

Effective MWEEs include opportunities for outdoor field experiences that are flexible, easily implemented, and maximize the value that outdoor learning brings to the MWEE experience, specifically, and to student achievement and stewardship, more broadly.
DEVELOPING EFFECTIVE MWEES: COMMON CHALLENGES AND HOW TO ADDRESS THEM

Background: How do outdoor field experiences enhance the MWEE?

As noted above, MWEES situate learning in authentic, real-world contexts—many of which are most productively explored outdoors in field-based contexts. This allows students the opportunity to directly interact with the environments that reflect the core ideas and concepts that they learn in school. Outdoor field sites allow students to access materials, resources, and phenomena in unique and authentic ways that can stimulate preexisting understandings, critical thinking, and reasoning. What’s more, outdoor field sites allow students to engage in authentic disciplinary practices including asking questions and planning and carrying out investigations as they construct sophisticated understandings about the issues under investigation.

It is important that MWEE providers design outdoor experiences that directly support the learning objectives that have been identified as project goals and that add clear value to the overall experience. In other words, outdoor experiences should contribute to the learning in ways that traditional classroom or laboratory settings may not.

Background: What are some of the obstacles to implementing Outdoor Field Experiences?

Outdoor experiences are critical components of the MWEE experience, however taking students outdoors during instructional time can be difficult for teachers, even if they recognize and appreciate the value of the experience. Many factors can impede teachers’ confidence and willingness to take students outdoors. These often include concerns over the time available for the activities, safety, and student behavioral management. If the outdoor experience is off-site, there may be additional funding needs and logistics to consider. It is thus important that MWEE development teams recognize some of these challenges and are proactive about working toward solutions.

Many MWEES include outdoor field experiences that are facilitated by or with the support of non-formal education providers or other partners. This can help to ensure that teachers have the support that they need to implement the outdoor components. There is also the potential, however, for these situations to lead to confusion about the role of the teacher compared to that of external partners and may reduce teachers’ feelings of self-efficacy for implementing parts of the MWEE with or without external support. Some of these potential dilemmas may be resolved by designing a MWEE with clear leadership roles for the teachers as well as by attending to the relationship between the teachers and the non-formal partners in the teacher professional development.

To increase the likelihood that teachers are willing and able to implement the outdoor field components, MWEE development teams should also consider designing outdoor experiences that are flexible regarding the time they require and experiences that can be productively implemented on or near the school grounds in addition to off-site experiences that may be involved.
As previously noted, MWEE development teams will need to consider the curricular scope and sequence of the course in which the MWEE will be taught as well as the school calendar when planning for outdoor field experiences. Strong connections between the outdoor experiences and other MWEE elements must be made explicit for students as they work to continuously apply what they’ve learned throughout the MWEE and draw conclusions between and among MWEE activities, especially if there is a chance that the outdoor elements might be separated from the other components due to scheduling conflicts. This will help to ensure that outdoor field experiences are presented as opportunities to extend and enhance investigations into the issue, rather than isolated events or field trips and will increase the opportunities for students to draw deeper meaning from the experiences.

Consider a MWEE that focuses on understanding how litter enters our waterways in order to make sense of how changes in the earth’s surface can cause impacts to other Earth systems (a disciplinary core idea of earth science courses, addressed by the Next Generation Science Standards in ESS2-2). The MWEE might engage students in going outside to engage in authentic scientific practice by making observations and collecting data on the topography of the surfaces of the school grounds to draw conclusions about the effect of runoff, rather than simply observing satellite imagery of the site. A provider could design the experience with the flexibility to occur on the school grounds in limited or extended amounts of time, to make it easier for teachers to accommodate the outdoor experience into a single class period. Observing and collecting data on the actual land for which they are drawing conclusions can help to make the concept of runoff less abstract to students and can thus better support deeper understandings of the relevant concepts.

Strategies for Minimizing or Avoiding this Challenge

- Design outdoor field experiences to directly support standards-based learning through engagement in authentic disciplinary practices.
- Design outdoor field experiences that directly and clearly connect to, support, and are supported by all other MWEE elements.
- MWEEs that feature outdoor field experiences that require transportation and funding to offsite locations should also consider options for outdoor experiences that can take place on or in proximity to the school grounds.

Additional Resources

There are several tools in the “Planning Toolbox” of the An Educator’s Guide to Meaningful Watershed Educational Experiences that can help MWEE development teams design Outdoor Field Experiences that are dynamic, student-centered, flexible, and work productively with the other elements in the MWEE experience. The “Incorporating Outdoor Field Experiences” tool may be used to evaluate potential sites for Outdoor Field Experiences, identify logistical considerations, and articulate how investigations at the outdoor site(s) will
support learning through the driving question and connect to student-driven action projects. Furthermore, the Issue Investigation pages in the Environmental Literacy Model Planning Documents can help MWEE development teams and project partners organize both in-classroom and outdoor field experiences that are student-centered and directly connected to the learning objectives.

♦ Challenge 4: Planning Student-driven Action Projects

The Chesapeake Bay Program stipulates that MWEE programs should allow students to identify, explore, implement, and evaluate solutions for action that address conclusions and claims drawn through investigation. Effective MWEEs support the development of stewardship and responsible ecological attitudes through student-centered and informed action projects.

Student-driven action projects are an essential component of the MWEE and are integral to the overall success of the MWEE program. The effectiveness of MWEEs is often jeopardized when development teams neglect to provide adequate consideration and planning around the student action component. For example, some MWEE programs view the action component as a separate or mere “follow-up” to the MWEE experience, as opposed to supporting and being supported by the other elements. In some cases, programs provide only tenuous connections to stewardship (for example, asking students to identify an action that they can take to “keep the Bay healthy”) without providing the opportunity to explain the reasoning behind their answers or to evaluate the effectiveness of the actions for addressing a given problem. In other cases, MWEE programs require that the teachers incorporate opportunities for student action without providing adequate support, resulting in the action component being limited, optional, disconnected from the other MWEE elements (in other words, the action did not directly relate to conclusions drawn from field investigations), or eliminated altogether. Insufficient attention to student-driven action projects risks the ability of the MWEE program to meaningfully support the development of student stewardship attitudes and actions and does not fully support the Student Outcome of the Environmental Literacy Goal of the 2014 Chesapeake Bay Watershed Agreement.

Effective MWEE programs include student-driven action projects that support stewardship attitudes and behavior. They directly connect these opportunities to the other MWEE elements, including curriculum connections, issue investigations, and outdoor learning experiences.

Background: What is stewardship? What leads to the development of stewardship attitudes and behavior?

An essential goal of MWEEs is to foster stewardship ethics and ecological attitudes in students and to prepare every student with the knowledge and skills necessary to responsibly protect and restore their local watershed. There are many ways to think about and define environmental stewardship. Generally, it refers to the responsible use and protection of the natural environment. It means engaging in behaviors that influence the course of human-caused
change within ecological systems to support the resilience and stability of ecosystems and promote our own well-being. It further means displaying behavior that consciously seeks to minimize the negative impacts of one’s actions and the actions of the community on Earth’s systems.

Students are critical stakeholders for supporting ecosystem resilience and stability through stewardship. MWEEs can provide powerful opportunities for students to learn about and engage in stewardship activities that will have long-term influence over the ways that students make sense of and interact with the natural world.

Several factors can have positive or negative influences on an individual’s choices and actions regarding environmental stewardship. These include internal factors such as environmental knowledge, motivation, values, attitudes, sense of the locus of control, perceived responsibilities, and priorities. They also include external factors such as institutional and cultural factors. If MWEEs are to have lasting impacts on the stewardship behaviors of students, they must go beyond simply engaging students in restoration activities and attempt to access some of the other factors that may influence behavior change. It is important to empower students throughout the MWEE to give voice to their thoughts about, feelings toward, and understandings of the core ideas underpinning the environmental topics under investigation as they define “the issues” for themselves and each other. These thoughts, feelings, and understandings should directly connect to and guide the process of developing action plans. Furthermore, students should be actively engaged in identifying and evaluating strategies and solutions that they can influence and/or implement. Authentic, student-driven engagement can be critical for supporting students’ perceptions that they, themselves, can bring about change through their actions. In other words, it is important for helping students develop a strong internal locus of control.

In some cases, MWEE designers may have a predetermined action project already built into their MWEE design. For example, a MWEE focused on the impacts of human activity on local waterways might include an action project that asks current students to build a schoolyard rain

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garden and students in subsequent years to maintain the rain garden. In such cases, students must be still given opportunities to understand, justify, and evaluate the action in order to establish a sense of autonomy and responsibility for affecting change. For example, if students are allowed to develop actionable claims that describe the problem for which the rain garden serves as a solution, are able to use evidence from their own MWEE investigations to support the claim, and are given the opportunity to reflect on and evaluate the relative merits of the rain garden for solving the problem—potentially identifying alternative solutions as well—the MWEE may still allow students to become personally invested in the action and could contribute to lasting stewardship attitudes. This situation is not ideal, however, and as the years progress (and teachers and partners become more familiar with the experiences), the grantee may find they can more authentically incorporate student voice, not only in thinking critically about decisions that are made for them but in influencing the decisions that influence the casual chain of human impact, themselves.

Strategies for Minimizing or Avoiding this Challenge

- Students should have meaningful contributions to the rationale behind the action projects as well as the design, implementation, and evaluation of the actions as solutions to monitor or mitigate the issues investigated in the MWEE learning experience.
- Student action projects should directly connect to the investigations and overall learning goals and should be purposefully designed as opportunities to apply, enhance, and/or extend student learning.

Additional Resources

*An Educator’s Guide to Meaningful Watershed Educational Experiences* provides information and tools specifically designed to support the development of student-driven action projects. The Guide describes the different types of action projects that B-WET promotes (Watershed Restoration or Protection, Everyday Choices, Civic Engagement, and Community Engagement) and provides suggestions for incorporating youth voice into the MWEE. The “Moving from Claims to Informed Action” tool helps MWEE development teams visualize potential options for student-driven action by articulating a claim based on conclusions drawn from the MWEE investigations. This exercise can be productive for helping MWEE planners understand the processes that students will undertake and can help stimulate their own ideas for the type of stewardship-related activities the MWEE might inspire. Finally, the Stewardship and Civic Action pages in the *Environmental Literacy Model* can help MWEE development teams visualize and plan the steps that students may take as they identify solutions to the issues, develop plans for action, implement their plans, and evaluate and reflect on the experience.

♦ Challenge 5: Providing Effective Teacher Professional Learning

The Chesapeake Bay Program recognizes that MWEEs depend on teacher facilitation and ongoing support of student learning. Effective MWEE programs include teacher professional
DEVELOPING EFFECTIVE MWEES: COMMON CHALLENGES AND HOW TO ADDRESS THEM

learning opportunities that allow teachers to engage in activities and discussion to develop and enhance their professional knowledge and practice to provide high quality, productive, and meaningful learning experiences for their students.

Effective and productive teacher professional learning experiences (often referred to as professional development) are dynamic, responsive to the needs of the teachers, and actively involve teachers in their own learning.

Some MWEE programs provide professional learning opportunities that focus exclusively on developing teachers’ understanding of fact-based content and procedural skills relevant to student engagement in the MWEE experiences, rather than providing opportunities for teachers to understand the goals and rationale behind the MWEE as an approach to learning and stewardship. MWEE programs that do not engage teachers in critical reasoning and evaluation of the MWEE approach and focus instead exclusively on engaging in and facilitating MWEE activities are often unable to generate the support and buy-in necessary for teachers to invest in long-term MWEE implementation.

Effective MWEEs focus on supporting teachers to develop the knowledge and skills to not only implement MWEE activities but to incorporate the MWEE approach to learning into their teaching practice. They invite teachers to help define and shape how the MWEE can become an effective tool for helping them accomplish professional goals for student achievement as well as community goals for stewardship and civic action. Effective MWEEs further provide opportunities for formal and non-formal educators to develop a common language as they collaborate to reach shared goals.

Background: What is teacher professional learning and how can it benefit a MWEE program?

Teacher professional learning opportunities allow teachers to engage in activities and discussion to develop and enhance their professional knowledge and practice in order to facilitate high quality, productive, and meaningful learning experiences for their students. In other words, learning programs for teacher participants should be designed with short-term outcomes that focus on teacher learning and long-term outcomes that focus on student impacts.

Effective professional learning includes activities that develop and enhance teachers’ knowledge of the disciplinary core ideas and practices they teach, understanding of how students learn, and their abilities to analyze a variety of types of student work and achievement. These opportunities should involve collaborative, inquiry-based learning, and critical reflection on their learning and pedagogical (teaching) practice.

Productive professional learning to support MWEE implementation will subsequently allow teachers to interact with and develop deeper understandings of the disciplinary core ideas (the science, social studies, mathematics concepts, etc.) that students will explore. Teachers should
also be engaged in understanding the *rationale* behind MWEEs—in other words, they should be invested in understanding how the MWEE approach supports student learning and can lead to stewardship and citizenship. For many teachers, the MWEE approach to situating learning in the context of environmental issues and using field-based experiences to investigate those issues with applications in student action may be quite different from the approaches to teaching to which they are accustomed. It is important, therefore, that teachers are given time to evaluate the MWEE approach and to critically reflect on how it can be “put to work” for them. In other words, how teachers can utilize the MWEE to help them meet the demands of their profession and lead to positive productive outcomes for their students. MWEE development teams might find it beneficial to explicitly point out the connections between the MWEE approach and other, similar, instructional models with which teachers might be more familiar. For example, some educators find it productive to think of the MWEE as a type of *Project-based Learning* that focuses specifically on environmental challenges and problems and for which action projects meet stewardship goals.\(^6\)

Just as goals for *student* learning must focus on opportunities for building conceptual understandings in addition to acquiring factual information and procedural skills, professional learning program activities should be designed to focus on goals for teacher learning. It often is insufficient to only engage teachers in field-based techniques (such as water quality testing or macroinvertebrate sampling) to demonstrate how the techniques are done. Teachers should also be given the opportunity to understand the benefits and potential drawbacks of the techniques, reason through the causes and potential impacts of the results, as well as determine causal relationships between data, observed phenomena, and human activities. The knowledge and skills that teachers learn through engagement in, critiques of, and reflection on activities and processes important for supporting student success.

Teacher professional learning sessions are also productive opportunities for formal and non-formal educators to work together to understand more about the goals, priorities, challenges of educating young learners in their respective contexts. There is much that classroom teachers and field-based educators can learn from each other as they work together on the shared goal of providing meaningful learning experiences for students. Furthermore, it is an opportunity to develop a shared language for understanding and discussing the goals, objectives, and outcomes of the project.

Finally, it is extremely important that significant portions of teacher professional development sessions are conducted outdoors in which approaches to teaching and learning in field settings may be modeled, practiced, discussed, and refined. Facilitating learning experiences outside of traditional classroom settings often require specific considerations for behavior management, distribution of resources and materials, and more. MWEE Professional Learning opportunities should allow teachers time to practice and discuss outdoor teaching and learning techniques in

order to feel comfortable facilitating them with their students as well as serving as resources and support for their colleagues.

Background: How do we identify, acknowledge, and address barriers to MWEE implementation?

The ultimate success of sustainable MWEEs depends on the commitment of teachers. It is common for all education reform efforts and curricular modifications to face challenges to implementation and the success of new programs is often deeply connected to teacher beliefs and their perceptions of the barriers to implementation. It is therefore important that professional learning activities provide purposeful opportunities for teachers to identify the challenges to MWEE implementation that they perceive or anticipate, and that careful time and consideration is devoted to helping those challenges be overcome. In some cases, this may mean adjusting MWEE activities to ensure they are best able to meet the needs of the participating teachers and students.

Background: What are effective models for teacher professional learning programs?

There are many effective models and formats for teacher professional learning to support MWEE implementation. Workshops, courses, and institutes that offer sustained activity (usually outside of the classroom) are common types of professional development. Research indicates that professional development activities that include mentoring and in-class coaching may further increase the likelihood that teachers are able to make connections to their classroom practice. Correspondingly, many MWEE projects have found success with a blend of teacher workshops (or institutes) that initially focus on training a group of “lead” teachers who then provide training, coaching support, and peer advising to others. These lead teachers are often directly recruited with the support of district-level partners. It is particularly beneficial if there is at least one representative from each of the target schools who can participate in the leadership MWEE training, as they can serve as on-site resources for their school colleagues moving forward. This approach can be particularly productive when trying to reach large school districts and/or when resources (including time and funding) may be limited.

Though not reviewed as part of this report, another approach to reaching broad audiences, particularly if resources are limited, is blended online learning. This emerging approach often involves providing participants with a baseline understanding of fundamental ideas before attending in-person training. The Chesapeake Bay Program, for example, has developed the “MWEE 101” online course to provide foundational information about the essential elements and supporting practices of a MWEE as well as an overview of the tools and resources that can

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8 For more information and/or to participate in the MWEE 101 online course, visit https://cbexapp.noaa.gov/course/view.php?id=5555
be used to support the development and implementation of MWEEs. Blended learning is increasingly being used to provide consistent training across geographies, helping to address issues around access and equity to robust professional learning. For MWEE professional learning, the blended model provides an opportunity for in-person training hours to focus on modeling effective practices for planning and implementing MWEEs rather than spending time on the basics of the MWEE framework.

Strategies for Minimizing or Avoiding this Challenge

- Professional Learning programs should allow opportunities for teachers to apply what they are learning (particularly content and skills related to the environmental issues under investigation) to their planning and instructional practices.
- As teachers engage in professional learning, they should be invited to reflect on the connections between MWEE activities and student learning outcomes.
- Teacher participants should be positioned as professional experts and purposeful opportunities for their perspectives and experiences to shape the MWEE should be built into professional learning activities.
- Professional Learning programs should include productive opportunities for teachers to share their perceptions about the potential barriers or challenges to MWEE implementation. The nature of these barriers, particularly the perceived locus of control for overcoming them, should be actively discussed and solutions sought.

♦ Challenge 6: Effectively Capturing Affect and Attitude

MWEEs can be dynamic, transformative experiences for students and teachers. They very often have noticeable impacts on the feelings and attitudes of participants. Frequently, however, MWEE programs focus on the impact of the program on participant affect at the expense of other benefits.

Affect and attitude are related but are distinct constructs that can be easily confused. In the case of MWEEs, affect refers to the effect of an experience on a participant or their emotional reaction to it. Attitude refers to more long-term mental impacts. Attitude is a more deep-rooted and settled way of thinking or feeling about something that is often reflected in a person’s behavior. A MWEE experience might positively influence a participant’s affect (for example, being on the water in a boat may make students feel happy) but it might not necessarily influence their attitude (for example, it might not impact their desire, inclination, or feelings of being able to mitigate negative impacts on water quality).

Effective MWEEs recognize the distinction between affect and attitude and are intentional about how the programs impact each.
Background: How can I demonstrate the added value of my MWEE regarding the impact on affect and/or attitude?

The nature of MWEE experiences (for example, the fact that they are situated in life-relevant contexts that often include outdoor settings that may be new to participants) make them highly likely to have direct impacts on participant affect (feelings, moods, and emotions). This is often easily measured in evaluations. For example, a test question that asks students if they “enjoyed touching live animals” is measuring the impact of the experience on student affect.

It can be more difficult to determine whether and how a MWEE experience impacts participants’ attitudes for the long-term. An underlying goal of MWEEs is to influence and inspire long-term behavior change, which is inherently linked to influencing and inspiring attitude. Many MWEE evaluations seek to assess the impact of the experience on participants’ attitudes by asking them if they are inclined [because of the experience] to take stewardship-driven action in the future. Asking participants to identify the actions that they believe they can take to effectively protect the Bay and to provide evidence from the experience could provide more information about the impact the MWEE has had on their attitude. It could also be beneficial for participants to identify barriers to their actions, factors that might influence their feelings of self-efficacy (belief in their own innate ability), and their perceptions about the locus of control of solutions for given environmental problems. Asking participants to respond to questions regarding attitude over longer periods of time (for example, asking first-year participants to complete attitude surveys in years two and three of a grant) could provide additional information on the impact of the MWEE on attitude.

Strategies for Minimizing or Avoiding this Challenge

- If identified as MWEE project goals, programs should differentiate between outcomes related to impact on attitude and impact on affect.
- Programs should clearly articulate the elements of the MWEE that are intended to impact attitude and/or affect.
- Programs should clearly articulate how the intended effects on attitude and/or affect the MWEE connect to priority goals for student understanding, citizenship, and/or stewardship.

Conclusion

Systemic MWEEs can provide transformative learning experiences for teachers, students, and communities and there are many stakeholders across the Chesapeake Watershed who are committed to MWEE success and who continually endeavor to bring MWEEs to local classrooms. Approaches to formal, non-formal, and informal education continue to be researched, explored, understood, and, teaching and learning practices continue to adapt and evolve. MWEE supporters including Chesapeake Bay Program partners, Natural Resource Agencies, State Departments of Education, and more are working hard to ensure that the
MWEE is responsive to the changing needs of educational systems and while there is no “hard and fast” rule for developing and implementing the perfect MWEE learning experience, the challenges and corresponding strategies outlined in this report are intended to provide insight and explanation into some best practices for MWEE design based on lessons learned over time and current educational research and scholarship.

More information about the MWEE, teaching resources, project ideas, and funding opportunities the Chesapeake Bay Program Bay Backpack site (http://baybackpack.com/). MWEE development teams and potential grantees are also encouraged to participate in the “MWEE 101” online course, which has been designed to provide foundational information about the MWEE approach to student academic achievement, environmental literacy, and stewardship (https://cbexapp.noaa.gov/course/view.php?id=5555).
Appendix A: Developing Goals, Objective, and Outcomes that Reflect Key Strategies

Developing goals, objectives, and outcomes that accurately reflect your MWEE project and can productively guide the MWEE implementation process is an essential part of the proposal process. They reflect how your program will seek to address the goals of the B-WET grant project and, as such, contribute to the Environmental Literacy goals of the Chesapeake Bay Watershed Agreement.

Understanding the Difference between Goals, Objectives, and Outcomes

<table>
<thead>
<tr>
<th><strong>Goals</strong></th>
<th>A goal gives a general statement of the purpose of your MWEE program. It is broad, even visionary, and describes what you wish to accomplish. Goals tend to be abstract and thus hard to measure. <strong>Example:</strong> The Chesapeake Environmental Learning Group will engage elementary school students in Jamestown County in a Meaningful Watershed Educational Experience focused on the impact of agricultural activities on water quality.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Objectives</strong></td>
<td>Objectives are more concrete and provide specific information about how the goal will be accomplished. They are, essentially, the steps you will take to reach your goal. <strong>Example:</strong> We will work with the science curriculum team for Jamestown County Public Schools to recruit a team of lead teachers and curriculum writers to support the development of the MWEE.</td>
</tr>
<tr>
<td><strong>Outcomes</strong></td>
<td>Outcomes reflect the expected results at the end of the grant reporting period. Outcomes represent how the goals and objectives that you’ve identified can be monitored and tracked through your evaluation system. <strong>Example:</strong> At least one teacher from each of the 12 elementary schools in the district will sign up for the program.</td>
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Comprehensive Example

**GOAL:** The Chesapeake Environmental Learning Group will engage students in Jamestown County in a Meaningful Watershed Educational Experience focused on the impact of agricultural activities on water quality.
## Objectives and Outcomes—Year One

<table>
<thead>
<tr>
<th>Objectives</th>
<th>Outcomes</th>
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</thead>
<tbody>
<tr>
<td>We will work with the science curriculum team for Jamestown County Public Schools to identify the most appropriate grade level and course for the integration of the MWEE into the standard curriculum. (Strategy 1: Curricular Connections)</td>
<td>□ Curricular connections will be verified and outlined in a support letter from the district</td>
</tr>
<tr>
<td>We will work with the science curriculum team for Jamestown County Public Schools to identify the most appropriate course for the integration of the MWEE into the standard curriculum. (Strategy 1: Curricular Connections)</td>
<td>□ Student learning outcomes will be verified and outlined in a support letter from the district</td>
</tr>
<tr>
<td>We will work with the science curriculum team for Jamestown County Public Schools to identify the standards that our MWEE should support to be fully and sustainably integrated into the curriculum (Strategy 1: Curricular Connections)</td>
<td>□ 75% or more of the participating lead teachers will confirm and articulate the relevance of outdoor field experiences to curriculum goals on a survey distributed following year one Professional Learning and again following the pilot phase (see year 2).</td>
</tr>
<tr>
<td>□ 75% or more of the participating lead teachers will confirm and articulate the feasibility of implementing outdoor field experiences on a survey distributed following year one Professional Learning and again following the pilot phase (see year 2).</td>
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<tr>
<td>□ Teachers will identify barriers to Outdoor Field Experience implementation and the design team will work to resolve the issues as they arise</td>
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<tr>
<td>We will use the tools in <em>An Educator’s Guide to Meaningful Watershed Educational Experiences</em> to design outdoor field experiences that directly support the standards for learning. Experiences will be facilitated by our own environmental educators on a local farm as well as on school grounds. Curricular relevance and feasibility will be confirmed by lead teachers and adjusted as needed (Strategy 3: Design Meaningful, Flexible Outdoor Field Experiences)</td>
<td>□ 75% or more of the participating lead teachers will confirm and articulate the relevance of plans for student action projects to curriculum goals on a survey distributed following year one Professional Learning and again following the pilot phase (see year 2).</td>
</tr>
<tr>
<td>□ 75% or more of the participating lead teachers will confirm and articulate the feasibility of plans for student action projects on a survey distributed following year one Professional Learning and again following the pilot phase (see year 2).</td>
<td></td>
</tr>
<tr>
<td>□ Teachers will identify barriers to Outdoor Field Experience implementation and the design team will work to resolve the issues as they arise</td>
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<tr>
<td>We will use the tools in <em>An Educator’s Guide to Meaningful Watershed Educational Experiences</em> to develop a plan for students to take informed action based on what they learn in their MWEE investigations (Strategy 4: Plan Student-Driven Action Projects)</td>
<td>□ At least one teacher from each of the 12 elementary schools in the district will sign up for the program.</td>
</tr>
<tr>
<td>□ The Design team and lead teachers will work together to identify existing assessments that correspond to the standards that the MWEE will address and/or develop new assessment resources to capture MWEE impact.</td>
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<tr>
<td>Along with the science curriculum team for Jamestown County Public Schools, we will recruit a team of lead teachers and curriculum writers to support the development of the MWEE unit.</td>
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## Objectives and Outcomes—Year Two

<table>
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<th>Objectives</th>
<th>Outcomes</th>
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<tbody>
<tr>
<td>Members of the lead teacher team will pilot the MWEE unit with their students and provide feedback through a series of Professional Learning workshops to the lead teacher team to support the pilot process during the school year. Dates and times of the workshop will be coordinated with the science curriculum office, the administrators of the represented schools, and the teachers. <em>(Strategy 1: Curricular Connections, Strategy 5: Provide Effective Teacher Professional Learning)</em></td>
<td>Curricular connections will be verified and outlined in a support letter from the district</td>
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<tr>
<td>The MWEE will demonstrate a positive impact on student learning and stewardship according to the assessment tools identified and/or developed in the design process.</td>
<td>At least 75% of the lead teachers will administer the assessments as part of the pilot process. Teachers will report on the results of the assessment (and the corresponding impact of the MWEE) in post-pilot surveys. Teachers will identify areas of improvement on post-implementation surveys that will inform updates to the MWEE.</td>
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## Objectives and Outcomes—Year Three

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<th>Objectives</th>
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<tbody>
<tr>
<td>We will work with the science curriculum team for Jamestown County Public Schools to roll out the new curriculum to all teachers of the targeted grade level/course. <em>(Strategy 1: Curricular Connections)</em></td>
<td>Curriculum roll-out will be verified and outlined in a support letter from the district</td>
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<tr>
<td>In collaboration with Teacher Professional Learning experts and the science curriculum team for Jamestown County Public Schools, we will provide a series of Professional Learning workshops to all teachers who may teach the MWEE unit. Dates and times of the workshop will be coordinated with the science curriculum office, the administrators of the represented schools, and the teachers. <em>(Strategy 1: Curricular Connections, Strategy 5: Provide Effective Teacher Professional Learning)</em></td>
<td>75% or more of the participating teachers will confirm and articulate the relevance of the MWEE to curriculum goals on a survey distributed following the Professional Learning 75% or more of the participating teachers will confirm and articulate the feasibility of implementing the MWEE on a survey distributed following Professional Learning Teachers will identify barriers to MWEE implementation and the design team will work to resolve the issues as they arise</td>
</tr>
<tr>
<td>The MWEE will have a positive impact on student learning and stewardship.</td>
<td>75% or more of the participating teachers will report positive impacts of the MWEE on student learning and stewardship attitudes on post-implementation surveys. Teachers will identify areas of improvement on post-implementation surveys that will inform updates to the MWEE.</td>
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</table>
References


