The Sustainable Jersey for Schools certification program recognizes that Education for Sustainability (EfS) can occur in the context of any academic discipline and at any grade level. This program action awards points for math lessons at the 4th-12th grade level that have delved into a sustainability-related issue, employed effective methods to engage students, and assessed student learning of sustainability core principles (or the enduring understandings of sustainability). To qualify for points, the sustainability instruction should have taken place in the school within eighteen months of the submission deadline.

**Why is it important?**

Sustainability encompasses responsible use of the planet's natural resources, prosperous local economies, and strong, civil societies with opportunities for all people. Education plays a critical role in shaping a sustainable future for all of us on this planet. But where should one begin? Education for Sustainability (EfS) is undoubtedly a big and important undertaking, but it does not look the same in different schools and classrooms. No two approaches are the same. Some schools will have sustainability embedded into their entire curriculum while others may have just one or two teachers adapting lessons to reflect EfS content and approaches. These early adopters of EfS are critical to paving the way to more widespread adoption of EfS in their school. Regardless of the scenario, the important message is to begin from one's current position, building sustainability instruction into lessons with the resources and support at hand.

Education for sustainability is much more than teaching content-related knowledge and skills; it is also about teaching new ways of thinking about and perceiving the realities of our world and the possibilities for change. EfS is based on the premise that the world is made up of various systems—natural systems, such as streams and forests, and man-made systems, such as economies, societies, and built infrastructure—that are all inextricably linked. EfS prepares students for their roles in creating a sustainable future by engaging them in solutions-based design and action that integrates knowledge across different disciplines and that considers diverse social, economic, and cultural perspectives. These skills and approaches also position students to perform more successfully across the school curriculum and prepare them for higher education and careers in a twenty-first century world. The enduring understandings (see list in EfS Questionnaire) that students gain from EfS are core sustainability principles that have application beyond the classroom. For example, one enduring understanding holds that each person is responsible for what they do and don't do, and that we are all interdependent on each other and the natural systems. Learning this concept could shape a student's mental framework of their place in their community and within the broader global context.

Lessons aligned with the Common Core State Standards for Math and English Language Arts and the Next Generation Science Standards can readily impart the enduring understandings of sustainability. Furthermore, there are great opportunities to link lessons to sustainability initiatives taking place in the school, such as school gardens, green cleaning, energy conservation programs, and recycling initiatives. Sustainable Jersey for Schools offers more than 80 actions where schools can earn points, and most of these provide opportunities to integrate student learning. Other sustainability certification programs such as Green Ribbon Schools and Eco-Schools USA, are also vehicles for integrating student learning into school sustainability initiatives.

**Who should lead and be involved with this action?**

The specific people who will be involved with designing and delivering sustainability education in the classroom will vary
depending on the organizational structure of the district and school. If Education for Sustainability (EIS) is being incorporated in one or more curriculum areas, then district personnel who develop, adapt and adopt curriculum, such as the Board of Education, Superintendent, Principal, Curriculum Supervisor, and teachers will need to be involved. Teachers have the opportunity to embed EIS into classroom lessons independently or collaboratively with other teachers. The school’s Green Team can help identify resources and opportunities to enrich learning by linking them to sustainability initiatives, as well as to various programs and projects taking place in the school and community.

**Timeframe**

The timeframe necessary to incorporate sustainability into math education in a 4th-12th grade classroom will vary. In some cases, lesson plans that feature sustainability concepts and EIS approaches already exist and math teachers can readily incorporate these into their class curricula with little or no adaptation. In other cases, more time (one to two months) may be required to adapt lesson plans, secure resources needed to implement the EIS lessons or units, and even train teachers to effectively deliver the EIS lessons. If curriculum updates are proposed to incorporate EIS, a much longer planning and implementation horizon of twelve to eighteen months may be needed.

**Project costs and resource needs**

Highly effective EIS lessons can be planned and incorporated into classroom instruction time with little or no additional costs. There are many free resources available to support the teaching of various topics with a sustainability lens.

Robust EIS curriculum integration efforts may incur costs for a curriculum coach or consultant, curriculum supervisor, and/or teacher salaries to develop new curriculum materials. After updating a curriculum to incorporate education for sustainability concepts, the district may also need to provide professional development to the teachers on the new curriculum and its goals.

Student transportation costs and fees to support place-based learning in the community may also be incurred.

**What to do, and how to do it ("How to")**

This section provides guidance and recommendations for implementing the action. A school/district does not need to follow this guidance exactly as long as it meets the requirements for earning points for this action.

1. Identify areas within the 4th-12th grade math curriculum or specific grade level lessons that are linked to sustainability issues (climate change, energy, water, waste, ecological systems, food systems, economic systems, health and wellness, social and cultural systems, or the built environment) and which lend themselves to teaching approaches that are inquiry-based, experiential, interdisciplinary and/or place-based.

2. Determine the enduring understanding(s) related to sustainability (EIS Questionnaire) that the students are to gain from the lessons (the learning objective).

3. Design tools—such as a rubric—and methods to properly assess whether students have grasped the sustainability enduring understanding(s) of the lesson. The assessment must be aligned with the sustainability-focused enduring understanding. See the "Resources" section for references to effective and aligned assessment.

4. Identify places (e.g., school grounds, cafeterias, town halls, parks) and operating systems (e.g., transportation, food service, water supply, building energy efficiency systems, waste management, and recycling) in your school community, including other institutions, organizations or businesses, which may provide opportunities for place-based sustainability lessons. Check with the school or district Green Team to identify sustainability initiatives being undertaken by the school that may lend themselves to student learning activities.

5. Optional: If available, submit a copy of the unit overview that the sustainability lessons are part of. Relevant photographs, videos, and news articles may also be submitted.

6. Consider reaching out to community organizations, institutions, and/or businesses that could potentially serve as partners to provide resources for sustainability education – e.g., to gain access to speakers/performers, historical documents, and special events.

7. Develop a significant sustainability lesson plan or unit along with the corresponding assessment tool of student learning related to the sustainability enduring understanding(s). The sustainability lessons need to employ at least one of these instructional approaches:

   - Inquiry-based: Ask questions, plan and carry out investigations, analyze and interpret data, construct explanations, engage in argument based on evidence.
• Experiential: Students learn through doing—participating in projects, events, challenges, experiments and other learning activities.

• Place-based student learning: Students participate in investigations and learning activities in school grounds, neighborhoods, or natural areas that engage them with real-life scenarios that are tangible, observable and meaningful to them.

• Interdisciplinary: Two or more teachers covering different academic disciplines design and/or present related lessons that integrate subject matter from two or more academic disciplines.

8. Document and assess student learning of the sustainability enduring understanding(s). Students can demonstrate learning using a variety of methods, such as reflecting on what they learned with pictures, videos, journal entries; teaching others via presentations to the class, school or external groups; writing and reflection journals. Samples of student work and graded rubrics for student work will need to be submitted as part of the action requirements. See Resources list at the end for references for strategies to create effective and aligned assessment.

9. Complete the Education for Sustainability Questionnaire (EfS Questionnaire).

What to submit to earn points for this action

In order to earn points for this action, the following documentation must be submitted as part of the online certification application in order to verify that the action requirements have been met.

1. Description of Implementation – In the text box provided on the submission page for this action provide a short narrative (about 300 words or less) of what has been accomplished and the impact it has or will have on the school community. The classroom sustainability instruction must have taken place within eighteen months of the application submission deadline.

2. A copy of the lesson plan that documents the planning and delivery of a significant lesson or set of lessons, and assessment of student learning of the sustainability enduring understanding (EfS Questionnaire).

3. Samples of student work and graded rubrics that demonstrate the students' learning of the enduring understanding(s) of sustainability.

4. Completed Education for Sustainability Questionnaire (EfS Questionnaire). On the questionnaire please check off: sustainability-related topic taught; enduring understanding of sustainability incorporated; and the instructional approach used to create a significant lesson or set of lessons. A short narrative summary of the learning objectives of the sustainability lessons, and a description of how student learning was assessed, is part of this short questionnaire.

5. Optional: Additional documentation of the lessons such as relevant photographs, videos, and news articles may also be submitted.

IMPORTANT NOTES:

There is a limit of six uploaded documents per action and individual files must not exceed 20 MB. Excerpts of relevant information from large documents are recommended.

All action documentation is available for public viewing after an action is approved. Action submissions should not include any information or documents that are not intended for public viewing. Please make note of this, especially if submitting photographs, videos, or the individual work of students. Efforts must be made to follow appropriate confidentiality policies of the school system.

Spotlight: What New Jersey schools are doing

Sustainable Jersey is currently working on identifying schools that have successfully completed this action. If you would like to showcase your school's accomplishments, please contact us at schools@sustainablejersey.com.

Resources

The following resources may be helpful in completing this action.

Resources and organizations that support sustainability education in math

Mathematics Awareness Month—April 2013, Mathematics of Sustainability, Educational and Related Resources—a compilation of resources and lesson plans for K-12th grade from the Sustainability Counts Initiative as part of Mathematics Awareness Month in 2013.

Oxfam, Everyone Counts: resources and lesson plans to analyze real data from a fifteen year study conducted by Oxfam following the lives of 12,000 children from four countries. Develops math skills as well as explores inequality in children’s lives around the globe. Geared to British math curriculum for 8 to 12 year olds. http://www.oxfam.org.uk/education/resources/everyone-counts

SAMPLE LESSONS

Cloud Institute, Curriculum Lesson Sets – each lesson focuses on a particular EFS Standard and its relationship to the materials cycles. In four grade-appropriate lessons (K-2, 3-5, 6-8, and 9-12), each set includes tailored lessons that have been aligned to The Cloud Institute’s Education for Sustainability (EFS) Standards and Performance Indicators, and that meet the McREL National Standards and Common Core State Standards by Cloud Institute and TerraCycle. https://cloudinstitute.org/k23568912/

Green Education Foundation, The Sustainability Lesson Clearinghouse—a variety of lesson plans for 6th to 8th grade math curriculum that engages students in conducting audits, calculations and building projects to understand compost systems, transportation, consumption habits and green technology. http://www.greeneducationfoundation.org/institute/lesson-clearinghouse/26-Math.html

Green Education Foundation, The Sustainability Lesson Clearinghouse—a variety of lesson plans for 9th to 12th grade math curriculum that engages students in conducting audits, surveys and making scale models to understand consumption habits and green energy technology. http://www.greeneducationfoundation.org/institute/lesson-clearinghouse/34-Math.html

Kid Wind Project, WindWise Education provides interdisciplinary lesson plans covering a variety of topics related to wind energy for grades 6 to 12. http://www.kidwind.org/#/windwise-1/ovnrg


RESOURCES FOR EFFECTIVE AND ALIGNED ASSESSMENT


Teaching Channel video on designing Rubrics. https://www.teachingchannel.org/videos/designing-rubrics

EDUCATION FOR SUSTAINABILITY BACKGROUND RESOURCES


Educating for Sustainable Development Toolkit is based on the idea that communities and educational systems within
communities need to dovetail their sustainability efforts. As communities develop sustainability goals, local educational systems can modify existing curriculums to reinforce those goals. http://www.esdtoolkit.org/esd_toolkit_v2.pdf