



# Intel's STEM

(Science, Technology, Engineering & Math)

# Resources





Inspiring and honoring excellence in Science, Technology, Engineering, and Mathematics teaching.

**Free professional development, curriculum, and resources.**



# Intel® Teach Program



- A worldwide proven professional development program – more than 10 million teachers trained in over 70 countries
- Research-based and independently evaluated
- Range of course offerings
- Developed by educators for educators
- A core part of Intel's Corporate Social Responsibility efforts

# Intel® Teach Elements Courses



**Compelling eLearning courses provide deeper exploration of 21st century learning concepts**



***Thinking  
Critically  
with Data***



***Assessment in  
21<sup>st</sup> Century  
Classrooms***



***Collaboration  
in the Digital  
Classroom***



***Project-Based  
Approaches***



***Educational Leadership  
in the 21<sup>st</sup> Century***

## **Available for Educators:**

- to take individually online
- to deliver to colleagues (register for a free Facilitation Guide)

**Available for Education Agencies (requires a license from Intel)  
to host in their local Learning Management Systems**

## E-Learning STEM Course (in pilot stage)



- **Audience:** 3rd-8<sup>th</sup> teachers
- **Overview:** Help teachers transition from “textbook” science to authentic inquiry
- **Usage Model:** Anytime, anywhere free professional teacher development. Can also be facilitated
- **Availability:** Course will pilot at 2012 Intel ISEF Educator Academy. *Look for it on our Web site in Fall of 2012*

# Thinking Critically with Data

Prepare students to think critically in our information-rich world

**Overview:** Prepare students by examining critical thinking with a focus on data analysis in our information-rich world



Syllabus - Thinking Critically with Data

• **Audience:** K-12 teachers

• **Usage Model:** Anytime, anywhere free professional teacher development. Can also be facilitated

• **Website:** Syllabus, course and facilitation guide

A screenshot of the Intel Teach Elements website interface. The page title is "Intel® Teach Elements: Thinking Critically with Data". Below the title, it says "Module 1: Information in Society and the Classroom" and "Lesson 1: Critical Thinking in the Digital Age, A3: Critical Thinking". The main content area is titled "Data and Information Examples" and includes a paragraph about professionals using critical thinking skills with data. Below the paragraph is a list of three numbered instructions: 1. Roll over the caption to see examples of how professionals convert data to information. 2. Click the Next button under the image to see more examples. 3. Click Next to continue. To the right of the text is a large image of a tablet displaying a table of "Estimated Enrollment Coverage\*\* 2008 - Selected States Among Subscribers Aged 62-67 Years† by State and Selected Local Areas - National Administrative Service Data, United States, 2008". The table has columns for "2008", "2009", "2010", "2011", and "2012". Below the tablet image is a pink "Health Statistics" button with a "Back" button below it. At the bottom of the page, there is a progress bar and navigation icons. The text "MODULE 1: LESSON 1 out of 4" is visible at the bottom left of the interface.

# Intel® Teach Elements Project-Based Approaches

[Design activities to engage your students with self-directed learning](#)



## Syllabus - Project Based Approaches

**Overview:** Improving teachers' understanding of project-based approaches to engage students



- **Audience:** K-12 teachers
- **Usage Model:** Anytime, anywhere free professional teacher development. Can also be facilitated
- **Website:** Syllabus, course and facilitation guide



# Curriculum





# STEM Unit Plans

Technology rich units that use project-based approaches

- Audience: K-12 teachers
- Overview: Technology rich units that use project-based approaches to support science, technology, engineering and math curriculum
- Usage Model: Unit plans teachers can use now or as models for their own planning
- Website: Unit plans are sortable by grade and subject. Includes information on project design, thinking skills and instructional strategies



The screenshot shows the Intel STEM Resources website. The top navigation bar includes links for 'For Business', 'For Home', 'Products', 'Support', and 'About Intel'. Below this is a search bar and a 'Change Location' link. The main content area features a large image of students working on a project, with the text 'Intel STEM Resources' overlaid. Below the image is a breadcrumb trail: 'Home > About Intel > Corporate Responsibility > Education > For K-12 Education > STEM > STEM Unit Plans'. The page title is 'STEM Unit Plans'. The main text describes the resources: 'Explore technology rich units that use project-based approaches to support the Science, Technology, Engineering, and Math Curriculum. Intel believes that young people are the key to solving global challenges. A solid math and science foundation coupled with skills such as critical thinking, collaboration and problem solving are crucial for their success.' Below this are sections for 'Designing Effective Projects', 'Project-Based Math Units', and a list of units categorized by grade level: 'Grades K-2', 'Grades 3-5', 'Grades 6-8', and 'Grades 9-12'. Each category lists specific unit titles and their corresponding grade levels.

# Design & Discovery

## Experience Engineering Through Design

- Audience: Ages 11- 15
- Overview: Introduces engineering through design. Teacher/Facilitator Guide; Curricular Materials; Supply List
- Usage Model: Designed for extended learning outside of the formal classroom.
- Website: Complete resource to organize and implement the program in school or in out-of-school setting (after school, summer camp)

**intel** Design and Discovery : Experiencing Engineering Through Design

Home > Education Home > K-12 Education > Teaching Tools

**Overview and Benefits** | Curriculum | Implementation Examples | Implementation Strategies

Looking for a way to build interest in engineering? Design and Discovery is an academic enrichment curriculum that engages students in hands-on engineering and design activities that enhance knowledge, and problem solving skill in the areas of science and engineering. Design and Discovery is most appropriate for informal education settings with extended blocks of time for hands-on activities.

**Overview and Benefits** >  
Design and Discovery is a free curriculum for students ages 11-15. The inquiry-based curriculum offers an interdisciplinary approach to engineering through design. Learn more about the benefits of Design and Discovery and its impact on students.

**Curriculum** >  
Design and Discovery includes the free, printable curriculum manuals for students and facilitators. In 10 sequential sessions of two to four hands-on activities each, students follow the design process, from identifying a design opportunity to developing a working prototype.

**Implementation Examples** >  
Design and Discovery can be implemented in a variety of settings—as an after-school club, a summer enrichment program, or as part of a science curriculum. See how Design and Discovery has been successfully adapted for different settings. Also, view student project examples to inspire your students.

**Implementation Strategies** >  
Mentors, field trips, and schedules are just a few of the considerations when implementing Design and Discovery. Review detailed information for planning your own program, facilitating your program, and engaging students in science and engineering fairs.

**What is Design and Discovery?**  
Understand more about the curriculum, the approach, and the potential it has for your students.  
[Learn more >](#)

**View a Video**  
See Design and Discovery in Action. View a 3-minute introductory video.  
To view the video, select a player and then click on your connection speed.  
   
Dialog: High Speed

**Quote to Note**  
"From the point of view of modern science, design is nothing, but from the point of view of engineering, design is everything."  
Edwin T. Layton, Jr.

# Phet & Phet Unit Plans

- Audience: K-12 teachers
- Overview: Research-based simulations of physical phenomena created at U of Colorado. Unit plans incorporating the simulations
- Usage Model: Phet offers free simulations in 20+ languages. Intel is creating unit plans that will model good inquiry and provide deeper investigation of topic in research projects.
- Website: Phet site includes simulations, area for teachers, translation utility.

The screenshot shows the PhET Interactive Simulations website homepage. At the top, a blue banner features the PhET logo and the text "Over 50 million simulations delivered" and "Interactive Simulations UNIVERSITY OF COLORADO AT BOULDER". Below the banner, there is a search bar and a "Search" button. The main content area is titled "Interactive Science Simulations" and includes the text "Fun, interactive, research-based simulations of physical phenomena from the PhET project at the University of Colorado." A prominent orange button says "Play with Sims...". Below this, there are logos for the National Science Foundation, The William and Flora Hewlett Foundation, and The O'Donnell Foundation. A section titled "Recipient of The Tech Award 2011" is also visible. At the bottom, there is a navigation menu with categories: "How to Run Simulations", "For Teachers", "About", and "PHET is supported by:". The "How to Run Simulations" menu includes links for "On Line", "Full Installation", "One at a Time", "Troubleshooting", and "FAQs". The "For Teachers" menu includes "Browse Activities", "Contribute Activities", "Workshops / Materials", "Translate simulations", and "Translate the website". The "About" menu includes "What's New?", "About PHET", "Contact Us", and "Donate". The "PHET is supported by:" section features a logo for "Installers by BITROCK" and mentions "our other sponsors, including educators like you." At the very bottom, there is a list of languages: English, العربية, 正體中文, Dansk, Engels, Suomi, Galego, বাংলা, Ελληνικά, Magyar, Bahasa Indonesia, 한국어, Македонски, العربية, Português, Português do Brasil, Црнокр, Türkçe, Tiếng Việt, and a copyright notice: "© 2011 University of Colorado. Some rights reserved."

# Intel ISEF Middle School Curriculum Supporting Successful Science Fairs

- Audience: 11-15 year olds
- Overview: Assist teachers who getting their students ready for a middle school fair
- Usage Model: Appropriate for formal and informal education settings
- Website: Provides curriculum and resources, and supporting documents. Week-to-week guide for directing students

The Intel ISEF Middle School Curriculum has been updated with a new look and new content for extending the inquiry-based science lessons. As of April 2011 you'll find:

- Activities aligned to state and national science content standards
- An updated resource list with online activities to enrich and extend your lessons through technology integration
- Web-based activities and online resources embedded throughout the curriculum
- Updated student handouts and supporting documents
- Bookmarks providing easy navigation and quick access to each section of the curriculum

**INTEL ISEF MIDDLE SCHOOL CURRICULUM**

Overview **Background** Curricula Resources

When middle school students conduct real scientific research to answer their own questions, they develop an enthusiasm for science and a sense of their own potential as problem-solvers. Getting younger students ready for a successful science fair experience also raises new questions and challenges for teachers.

**Intel ISEF Middle School Science Fair: A Guide for Teachers** offers a comprehensive curriculum and planning guide. It provides teachers with a detailed road map, outlining planning considerations and hands-on activities for the 30 weeks leading up to a fair. Downloadable files include the complete teaching guide, plus an accompanying set of resources and student handouts.

**Developed by Teachers**

The guide has been developed by a team of experienced science teachers and used in middle school outreach efforts in connection with the Intel International Science and Engineer Fair (ISEF).

Through an outreach effort to engage traditionally underrepresented students in mathematics and science, participants included students at Historically Black colleges and in urban communities serving a high percentage of minority students. Many participating students have gone on to enter science fairs affiliated with Intel ISEF. The experience builds their interest in science and boosts their confidence as learners.

Are you a middle school science teacher looking to enhance your curriculum with inquiry-based research culminating in a local student science fair? Begin your journey here:

- **Background Information**  
Learn about the development of the Intel ISEF Middle School Curriculum and how it can be integrated into both formal and informal learning environments.
- **Explore the Curriculum**  
View and print the Intel ISEF Middle School Curriculum. Download accompanying templates and handouts for use in your classroom or after-school science club.

# Thinking Tools: Visual Ranking

## Analyzing and Evaluating Information

- Audience: K-!2 students
- Overview: Web-based online tool where students apply criteria to an item in order to place in an hierarchy.
- Usage Model: Hands-on technology-based tool to be used within a lesson
- Website: Includes workspace, instructional strategies, unit and project examples focusing on math and science

The screenshot shows the Intel Visual Ranking Tool website. At the top left is the Intel logo. The main title is "Visual Ranking Tool : Analyzing and Evaluating Information". Below the title is a navigation bar with tabs for "Overview and Benefits", "Try The Tool", "Project Examples", "Instructional Strategies", and "Workspace". The "Overview and Benefits" tab is selected. The main content area contains a paragraph about the tool's purpose: "Making a list is usually straightforward and requires little thought. But when it comes to ordering and prioritizing items in that list, higher-level skills of analysis and evaluation are put to use. The Visual Ranking Tool brings focus to the thinking behind making ordered lists. Students identify and refine criteria as they assign order or ranking to a list. They must explain their reasoning and can compare their work with each other in a visual diagram. This tool supports activities where students need to organize ideas, debate differences, and reach consensus." Below this is another paragraph: "The tool and related resources are available for free, from any computer that is connected to the Internet. Students may work on their lists at home or at school, and can even compare their ideas with students located in distant classrooms." There are four sections with icons and titles: "Overview and Benefits", "Try the Tool", "Project Examples", and "Instructional Strategies". On the right side, there is a "Sign-in" box with "Teacher Workspace" and "Student Log-In" options, and a "Quote to Note" box with a quote from Michael J. Gelfb: "The exercise of ordering your favorites...ranking one a level higher than another, and then articulating why you chose the way you did requires a depth and clarity of consideration and comparison that inspires richer appreciation and enjoyment." Below the quote is the attribution: "Michael J. Gelfb, How to Think Like Leonardo da Vinci". At the bottom right, there is a "Contact Education" button. The footer contains "Terms of Use | \*Trademarks | Privacy" and "© Intel Corporation".

# Thinking Tools: Showing Evidence

## Analyzing and Evaluating Information

- Audience: 9-18 year olds
- Overview: An online tool that helps students construct well-reasoned arguments and prove their case with credible evidence
- Usage Model: Hands-on technology-based tool to be used within a lesson
- Website: Includes workspace, instructional strategies, unit and project examples focusing on math and science

**intel** Showing Evidence Tool: Analyzing and Evaluating Information

Home - Education Home - K-12 Education - Teaching Tools

Overview and Benefits Try The Tool Project Examples Instructional Strategies Workspace

**Anyone can have an opinion, but backing it up with well-articulated evidence requires careful thinking.** The Showing Evidence Tool helps students learn how to construct well-reasoned arguments and prove their case with credible evidence. The tool provides a visual framework to make claims, identify evidence, evaluate the quality of that evidence, explain how the evidence supports or weakens claims, and reach conclusions based on the evidence. This thinking tool supports activities where students debate differences, make and defend decisions, and analyze conflicting information.

The tool and related resources are available for free, from any computer that is connected to the Internet. Students may work on their claims and evidence at home or at school, and can be paired with another team to review their ideas.

**Sign-In**  
Teacher Workspace  
Student Log-In

**Quote to Note**  
"People generally quarrel because they cannot argue."  
Gilbert Chesterton  
(1874-1938)  
English writer

**Overview and Benefits**  
Learn more about the features of the Showing Evidence resource. Read what the research literature says about the learning opportunities in creating and defending well-researched arguments.

**Try the Tool**  
See how easy it is to use the tool. Follow a tutorial that helps get you started with using the tool in the classroom.

**Project Examples**  
Get project ideas from other teachers who have used Showing Evidence in the classroom. Learn how the tool promotes lively discussions as students evaluate evidence and debate their positions. Browse short project ideas or longer, detailed unit plans.

**Instructional Strategies**  
Learn effective strategies from teachers who have used the tool. Find ideas for planning a project, using the tool in an activity, and assessing what students have learned.

**Teacher Workspace**  
Set up a project when you're ready to use the Showing Evidence Tool with your class.

**Site Recommendations**  
Review the technical specifications that optimize use of the Showing Evidence Tool.

Contact Education

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# Thinking Tools: Seeing Reason

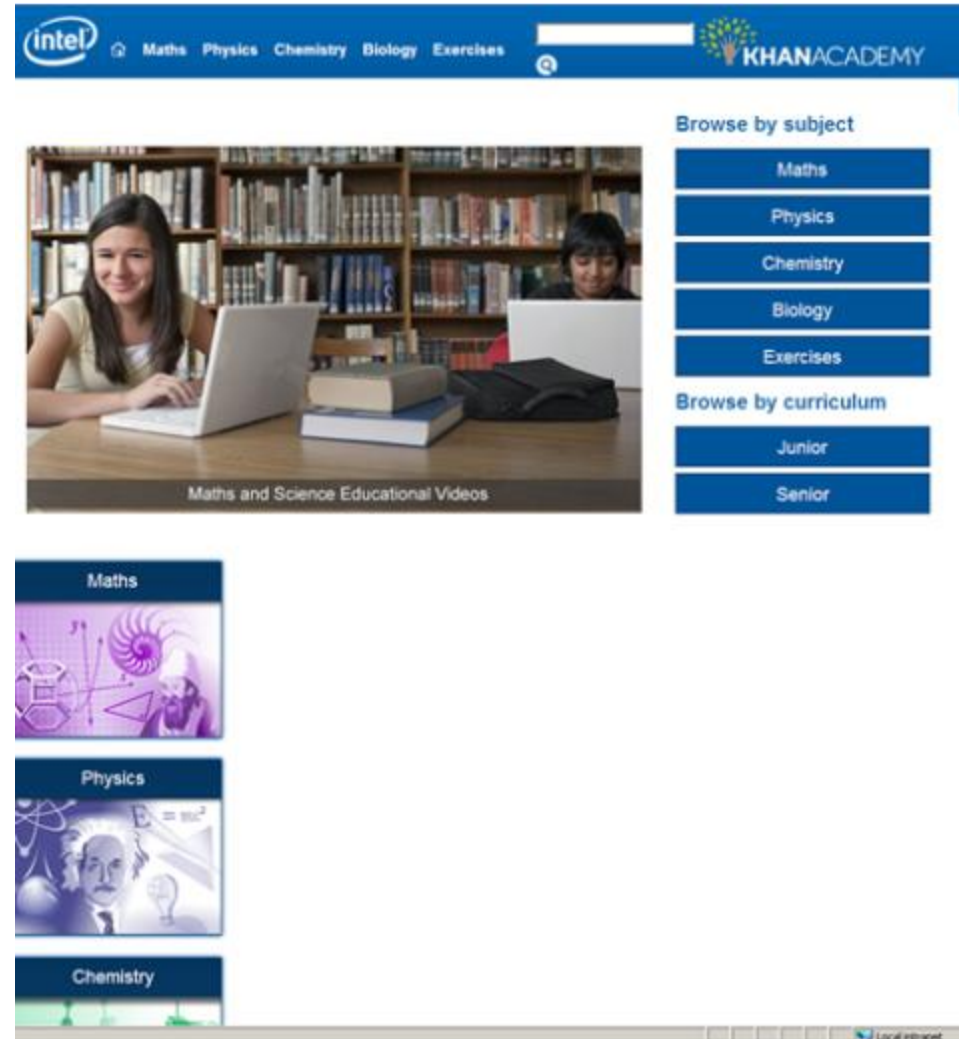
## Mindful Mapping of Cause and Effect

- Audience: K-12 students
- Overview: An online tool for students to create visual maps of factors and relationships in an cause and effect investigation
- Usage Model: Hands-on technology-based tool to be used within a lesson
- Website: Includes workspace, instructional strategies, unit and project examples focusing on math and science

The screenshot shows the Intel Seeing Reason Tool website. At the top, the Intel logo is on the left, and the title "Seeing Reason Tool : Mindful Mapping of Cause and Effect" is on the right. Below the title is a breadcrumb trail: "Home > Education Home > K-12 Education > Teaching Tools". A navigation bar contains five tabs: "Overview and Benefits", "Try The Tool", "Project Examples", "Instructional Strategies", and "Workspace". The main content area is divided into several sections. On the left, there are four small images with corresponding text: "Overview and Benefits" (Learn more about the features of the Seeing Reason resource...), "Try the Tool" (See how easy it is to use the tool using a demonstration version...), "Project Examples" (Get project ideas from other teachers who have used Seeing Reason in the classroom...), and "Instructional Strategies" (Learn effective strategies from teachers who have used the tool...). On the right, there is a "Sign-In" section with "Teacher Workspace" and "Student Log-In" buttons. Below that is a "Quote to Note" section with a quote by Gardner C. Anthony: "Any collection of related facts is difficult to grasp when expressed by figures in tabular form, but the same may be seen at a glance when presented by one of the many graphic representations of those ideas." At the bottom, there are sections for "Teacher Workspace" (Set up a project when you're ready to use the Seeing Reason in your classroom), "Site Recommendations" (Review the technical specifications that optimize use of the Seeing Reason mapping tool), and a "Contact Education" button. The footer contains "Terms of Use | Trademarks | Privacy" and "© Intel Corporation".

# Khan Academy

- Audience: 6-18 year olds
- Overview: Library of more than 2,500 videos to help students learn what they want, when they want at their own pace. Often used in flipped-classroom concept
- Usage Model: Free, on-line short videos with back-end tracking and exercises. Teachers can set up classes
- Website: Free in English. Intel is bundling 600 videos in an off-line application in different languages. Available 2012





# It's a Wild Ride

## A Roller Coaster Design Project

- Audience: 13-15 year olds
- Overview: Interdisciplinary project incorporating physics, math, social studies and writing
- Usage Model: 36-day long; in-school project involving several classrooms
- Website: Extensive resource for classroom teachers that includes strategies, lessons, assessment, and schedules

**intel** It's a Wild Ride : A Roller Coaster Design Project

Home - Education Home - K-12 Education - Teaching Tools

Learning That Works Working Together Assessment Supporting Success

**Looking to inspire and engage your students in meaningful learning?**  
Project-based learning is a compelling instructional approach for engaging students in authentic tasks that connect knowledge and skills across disciplines. *It's a Wild Ride* is a detailed case study designed for teachers wanting an inside look at the development and implementation of an interdisciplinary project enriched by technology. Students move from learning content-specific knowledge and skills to applying what they learn in a group design task. Ultimately, student teams must convince a theme park to accept their design through persuasive presentations.

Detailed descriptions, teacher materials, student work samples, and teacher reflections present this effective team-taught project from start to finish and behind the scenes. For teachers interested in adapting materials for their own use, most everything developed before, during, and after the project can be found on the Web site.

Explore each of the four sections of the case study to follow the team of teachers and their students through the project, see work in progress, study the results, and learn the behind the scenes planning.

**Learning That Works** ▶  
The *It's a Wild Ride* project engages 8th grade students in the design of roller coasters in their science, mathematics, social studies, and language arts classrooms. This section outlines the lessons and activities that occur in each classroom as the five-week project unfolds.

**Working Together** ▶  
A well-coordinated project is about organizing schedules and attending to how learning is sequenced and scaffolded. Once a project is underway, students and teachers alike need methods and tools to monitor progress and stay on track. This section presents a detailed day-by-day calendar, tools for monitoring and managing project work, and results of student work.

**Assessment** ▶  
This section tracks assessment that is ongoing and embedded in the project. The teaching team plans the project around specific standards to address and master in each classroom. Students know the criteria for quality work and participate in assessing their efforts.

**Supporting Success** ▶  
This section outlines cultural and structural factors in place at the school that support successful projects. Learn about the evolution and challenges of building this team of 8th grade teachers. These teachers rely on school leaders that go to bat for effective instructional practices, like teaming and extended block schedules.

**Intel® Teach Elements: Assessment in 21st Century Classrooms**  
Take an in-depth look at assessment that meets the needs of 21st century teaching and learning. Learn to plan, develop, and manage student-centered assessment.  
[Take an Intel Teach Elements Course >](#)

**Project Overview**  
[View \*It's a Wild Ride\* at-a-glance.](#)  
[Learn more >](#)

**Quote to Note**  
"We like hands-on activities but we do not always find them 'minds-on' or applicable. We wanted something that was fun and rewarding for students that contained rigorous, applicable skills- a high-interest unit that required students to apply math concepts in a science context."  
Theresa Maves

**Site Recommendations** ▶  
Review the technical specifications that optimize use of *It's a Wild Ride*.



# Intel supported student resources



# Skool™

## Free interactive math and science content

Teachers and students access interactive multimedia learning resources in math and science

**For** 12-18 year olds

A Web site with **interactive student simulations** with materials for teachers and parents

**Available** online, anywhere, anytime - in a variety of languages





# Resources to Assist STEM Educators



# Intel ISEF Educator Academy Community

Using science competitions to improve the quality of science education

The screenshot displays the Intel Educator Academy website. At the top, a header image shows a woman holding molecular models. The page title is "Intel Educator Academy". Below the header, there are navigation links for "Guest", "Login", and "Register". The main content area features a "Welcome to the Intel Educator Academy Community" section with a paragraph describing the community's purpose. To the right of the text are several icons and labels: "Learn" (STEAM, agendas, and presentations), "Share" (Pictures, stories, and ideas), "Plan" (Action Plans), and "Webinars" (Videos and Resources). The page also includes a "Recent Activity" section at the bottom, which currently shows a message: "You can't create documents here, but watch for documents with information you can use."

# Intel ISEF Toolkit

## Resources to support science fairs and science teachers

The screenshot shows the Intel Educator Academy Toolkit website. At the top left is the Intel logo and the text "Intel® Educator Academy Toolkit". To the right is a search bar with a "Search" button. Below this is a navigation menu with links for Home, Intel Educator Academy Support, Policy Support, Science Fair Support, Educator Support, FAQs, and Contact. The main content area features a "Welcome to the Toolkit" section with a paragraph explaining the site's purpose. Below this is a flowchart with four boxes: "Event Support", "Policy Support", "Science Fair Support", and "Educator Support", each with a brief description. To the right of the flowchart is a user profile for "Karen Merrill" with a list of menu items: My account, Create content, Image gallery, User list, Ask a Question, Invite a colleague, and Log out. Further down, there are sections for "Where to Start", "Online Community", and "Contacts". At the bottom, there is a "Image Gallery" section with a row of five small images showing students and teachers in various settings.

**Intel® Educator Academy Toolkit**

Home Intel Educator Academy Support Policy Support Science Fair Support Educator Support FAQs Contact

### Welcome to the Toolkit

The Intel® Educator Academy Toolkit was created to provide resources for you and your team as you organize your Intel® Educator Academy. Included in this website are checklists, presentation templates, sample agendas, photos, and additional files that will help you to create your event and support your local educators.

What materials are available on this site?

- Event Support**  
Explains how to set up an Intel® Educator Academy
- Policy Support**  
Support for STEM initiatives and your Intel® Educator Academy
- Science Fair Support**  
Templates and checklists to help you organize a science fair
- Educator Support**  
Tools and resources to assist STEM teachers

**Karen Merrill**

- My account
- Create content
- Image gallery
- User list
- Ask a Question
- Invite a colleague
- Log out

Use the links at the top of the page to view the content, files, and resources by topic. The menu on the right below your username gives you access to the image gallery. It also allow you to invite others to access the toolkit. Please explore this site and download any files you need to help make your Intel® Educator Academy a success!

**Where to Start**  
A companion user guide is available which will walk you through many of the questions you may have. Feel free to download it from the following link: [Toolkit User Guide](#).

**Online Community**  
Participants in Intel® Educator Academies are also invited to participate in the Intel® Educator Academy online community. In this online space, attendees can review current event materials, upload their action plans, and share photos and stories of success.

**Contacts**  
If you have questions about how to use this website, use the [contact form](#) (link in the upper right-hand corner) to submit your query. If you have a question about using or adapting the content found on the site, use the [Ask a Question](#) link in the right-hand block under your user name to submit your question.

**Image Gallery**  
Below is a sample of the images available for you to use. [Click to view more images...](#)

