



Connecting Middle Grades Science and Mathematics with TI-Nspire™ and TI-Nspire™ Navigator™ – Day 1

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Materials for Workshop Instructor*

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There are three categories of T³ Professional Development, each with a unique set of learning objectives. This workshop is focused on technology integration, and its objectives are as follows:

Technology Integration

- Emphasis on learning to use TI technology, with broad “how-to” coverage highlighting a wide range of features
 - Subject/content-focused training on appropriate usage of TI technology in the classroom
 - I am comfortable with essential technology skills for exploring math and science content.
 - I can design opportunities for students to use technology as a tool to deepen their understanding of mathematics and science.
 - I can locate and download TI activities that align to my standards.
 - I can describe the role technology should play in the successful implementation of my standards, and I can implement a vision of a classroom where students routinely use technology to engage in the practice and content standards.
-

Workshops focused on instructional practices and content knowledge have the following objectives:

Instructional Practices

- Emphasis on classroom practices with technology as a tool to enhance student learning
- Models CCSS, TEKS, and STEM tasks using in-depth discussions, reflective practices, and essential technology skills
 - I can demonstrate the importance of teacher actions for students’ engagement in the Practices, and I can take actions that will enable students to become mathematical and scientific practitioners.
 - I can describe the role that technology should play in the successful implementation of my standards, and I can implement a vision of a classroom where students routinely use technology to engage in practice and content standards.
 - I can design tasks for students to employ the Practices, using technology as a tool to deepen their understanding of mathematics and science.
 - I can ask questions designed to make student thinking visible – to push them to think about connections, make comparisons, or probe their understanding.

Content Knowledge

- Emphasis on content with technology as support
- Addresses critical, tough-to-teach topics and new content standards for CCSS or TEKS
 - I have a deeper understanding of the mathematics and science in my content area, and I am aware of the shifts in content that affect what I teach.
 - I can design opportunities for students to use technology as a tool to deepen their understanding of mathematics and science.
 - I can locate and download TI activities that align to my standards.
 - I can describe the role technology should play in the successful implementation of my standards, and I can implement a vision of a classroom where students routinely use technology to engage in the practice and content standards.



The following technology will be needed for Days 1-6:

- TI-Nspire™ CX CAS Navigator™ 30-user system
- 30 additional TI-Nspire™ CX CAS handhelds
- 60 standard-A to mini-B USB cables
- 30 mini-A to mini-B USB cables
- A laptop for each participant with the TI-Nspire™ CX Navigator™ Teacher Software installed

In addition to the above technology, the following technology will be needed for each given day:

Day 1

- 30 stainless steel temperature sensors (Vernier or TI)
- 30 Vernier EasyLink™ adapters

Day 2

- 15 Conductivity Probes
- 15 Vernier EasyLink™ adapters

Day 3

- 15 CBR 2™ motion detectors
- 30 stainless steel temperature sensors (Vernier or TI)
- 30 Vernier EasyLink™ adapters

Day 4

- 15 Gas Pressure Sensors
- 15 Vernier EasyLink™ adapters

Day 5

- 15 CBR 2™ motion detectors

Day 6

- 15 Dual-Range Force Sensors
- 15 Vernier EasyLink™ adapters

Optional

- Vernier EasyTemps can be substituted for stainless steel temperature sensors and EasyLink™ adapters
- TI-Nspire™ Lab Cradles can be substituted for Vernier EasyLink adapters

Supplies List

Day	Activity	Equipment/Consumable	Quantity (per 5 people)
2	Kidney Stones, Gravity, and the ISS	1000 mL beaker	1 total
		1 mL increment medicine droppers	1-2
		100 mL graduated cylinder	1-2
		Electronic balance	1 total
		Salt	1 small container total
		Distilled water	1 gallon per 10 people
		Yellow food coloring	1 very small container total
		5 oz. plastic cups	~10



Day	Activity	Equipment/Consumable	Quantity (per 5 people)
3	Construct a Coolant System	100 mL beaker	1-2
		5 oz. plastic cups	~10
		50%, 70%, and 91% alcohol	1 small container of each (total)
		Hydrogen Peroxide	1 small container (total)
		Salt	1 small container total
		Sugar	Around 5 sugar packets
		Distilled water	1 gallon per 10 people
4	Create a Cold and Hot Pack	100 mL graduated cylinder or beaker	1-2
		Baking Soda	1 small container total
		Potassium Chloride	1 small container total
		Ammonium Chloride	1 small container total
		Calcium Carbonate	1 small container total
5	How Does It Bounce?	Ball that bounces	1-2
	Radioactive Decay	M&M's	1-2 fun-size packs
6	Why Bigger is Not Necessarily Better	Balloons	1 per person
		String	Around 2 feet per group
		Meter Stick	1-2
	Net Force Balloon Race	Helium-filled Mylar Balloons	1-2
		Manila Folders	1-2
		Scotch tape	1
		Scissors	1



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9. Ticket Out	–



I can...
Login to class.
Open a transferred TI-Nspire™ document.
Grab and drag an object.
Locate specific keys on the TI-Nspire™ keypad.
Open a new document.
Add an application to a new document.
Open the TI-Nspire™ CX Navigator™ Teacher Software.
Use the Documents Workspace.
Create a TI-Nspire™ Navigator™ class.
Create and start a TI-Nspire™ Navigator™ class.
Use the built-in Vernier DataQuest™ application.

Instructor Notes

Student Login

PD Objectives

- Participants will log in to the TI-Nspire™ CX Navigator™ network as students in an existing class.

Materials Needed/Set Up Requirements

- Two TI-Nspire™ CX handhelds for each participant

Main Focus – Suggested Questions/Strategies for Accomplishing Objectives

- Distribute the loaner TI-Nspire™ CX handhelds to participants.
- Provide information to participants regarding his/her User Name.
- Have participants log in to the TI-Nspire™ CX Navigator™ class.
- If participants brought their own TI-Nspire™ handhelds, you will have opportunities later to help them update the operating system on each of their handhelds. It is suggested that you not spend time updating on the first morning of the workshop.
- Consider setting up a “parking lot” so that participants can list any questions or concerns.

Technology Tips

- Prior to the start of the workshop, create a TI-Nspire™ CX Navigator™ class using participants' names.
- If the names of the participants are not available prior to the workshop, use an existing class in your TI-Nspire™ CX Navigator™ Teacher Software or use the practice class provided with the workshop loan equipment. Or if time permits, set up a new class, and have each participant **Add a student to current class**, entering First Name, Last Name, and User Name.
- Inform participants that a network only needs to be selected once, not every time a handheld is logged in.

Instructor Notes

TI-Nspire™ CX Family Overview

PD Objectives

- Explore the keypad and Home Screen options of the TI-Nspire™ CX family of handhelds.

Materials Needed/Set Up Requirements

- *TI-Nspire_CX_Family_Overview.pptx*

Main Focus – Suggested Questions/Strategies for Accomplishing Objectives

- Show slide 2 of the PowerPoint presentation and discuss the main features of the TI-Nspire™ CX family of handhelds.
- Ask participant to fill in their copy of the *TI-Nspire™ CX Family Overview* as they work through the activity (the two-page document). Let them know that they have a blank copy of the *TI-Nspire™ CX Family Overview* in the Appendix. When they finish, show slide 3.
- Participants will explore the Home Screen options. Remind them that they can use the arrow keys to navigate through the various options or press **tab** repeatedly.
- Encourage participants to discuss the various Home Screen options.
- You might wish to revisit the Settings options with participants. Select **Settings > Status**, check the battery life and operating system, and then click **OK**. Select **Settings > Document Settings**. Discuss the difference between changing default settings and current document settings.
- Allow 10 to 15 minutes of individual exploration and five to 10 minutes for a whole-group debrief.

Technology Tips

- Participants may notice that the Home Screen option **Current** (under Documents) is “grayed out.” Let them know that when students are working in a TI-Nspire document, they might accidentally press the Home key (**Home**). To return to the current document, they can select **Current**.
- The shortcuts **ctrl** **C** and **ctrl** **V** are mentioned in the document. You might wish to discuss other short cuts common to the TI-Nspire and computers. Be sure to mention the Undo option.
- If participants with TI-Nspire™ Clickpads have the latest OS, they can access the Scratchpad through the Home Screen or by pressing **ctrl** **0**.

Summary Reflection Question

- How does using the handheld compare to using a computer and/or cell phone?
- When could the Scratchpad options (Calculate or Graph) be useful?

TI-Nspire™ CX Scavenger Hunt – The Calculator Application**PD Objectives**

- The primary goal of the activity is give participants practice using the Calculator application.

Materials Needed/Set Up Requirements

- If needed, explain the difference between the Calculator application and the Scratchpad.
- Do not introduce participants to the Scratchpad until later to avoid confusion.

Main Focus

- Participants will become familiar with the Calculator application.
- The instructor role for this activity is to walk around and observe.

Introduction to the TI-Nspire™ CX Family**PD Objectives**

- Get started using the TI-Nspire™ CX family of handhelds.
- Learn to turn on the handheld, navigate the Home Screen, and locate the Scratchpad key.

Materials Needed/Set Up Requirements**Main Focus – Suggested Questions/Strategies for Accomplishing Objectives**

- Allow 10 minutes of individual or small group exploration.
- This activity will allow participants to start using the handheld while you are dealing with handing out equipment, taking attendance, and so on.
- Allow 5 minute whole-group debrief.
- Discuss any questions related to the exploration.

Technology Tips

- If participants have their own handheld with an old OS, let them use a Workshop Loan handheld to ensure they see the Home Screen icons as shown on the handout.
- Participants can charge their new handhelds overnight.

Summary Reflection Questions

- How does using the handheld compare to using a computer and/or cell phone?

Instructor Notes

Demonstration – Formative Assessment

PD Objectives

- The focus of this demonstration activity is the use of the TI-Nspire™ CX Navigator™ System for assessment.

Materials Needed/Set Up Requirements

- One of the following TI-Nspire™ documents, depending on which workshop is being delivered:
 - *Demo_FA_Math.tns*
 - *Demo_FA_MG_Science.tns*
 - *Demo_FA_HS_Science.tns*
 - *Demo_FA_MGMS.tns*

Main Focus – Suggested Questions/Strategies for Accomplishing Objectives

- Participants will play the role of students who respond to questions in an assessment document sent to their handhelds by the TI-Nspire™ CX Navigator™ System.
- The instructor acts as the class teacher. The instructor again demonstrates how to send a document to a class.
- Use the Auto-Refresh feature of Class Capture to demonstrate the monitoring of student work during a class.
- Demonstrate how to collect a document, save it to Portfolio, and show the Class Results in the Review Workspace.
- Compare this assessment to the Quick Polls that were sent during other activities.
- The participant materials for this activity are designed to serve as a guide for the demonstration. Ask the participants to NOT follow along with the print materials while you are giving the demonstration, but assure them all the steps to perform the TI-Nspire™ CX Navigator™ tasks are in the materials. They will have many opportunities to discuss and practice various assessment options available with the TI-Nspire™ CX Navigator™ System.

Technology Tips

- Remind the participants that they do not submit their responses as they did for Quick Polls.

Summary Reflection Questions

- How does the ability to compare a previous assessment of the same concept in the Portfolio enable you to more easily gauge the growth of student?
- What benefits does the use of the Auto-Refresh feature of Class Capture provide when students are working on an assessment or any other assignments?

Instructor Notes

Circuit Construction Kit

PD Objectives

- Participants will learn to manipulate a simulation.
- Participants will learn to monitor a lab using the Class Capture feature.
- Participants will see how using Live Presenter can help implement the lesson.

Materials Needed/Set Up Requirements

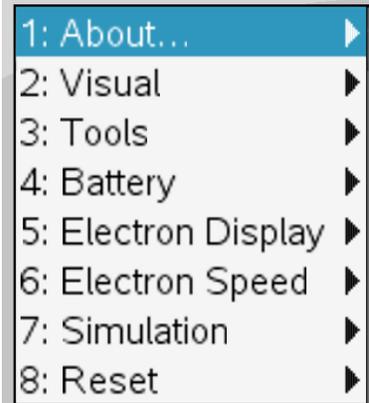
- *Circuit_Construction_Kit.tns*
- TI-Nspire™ CX Navigator™ System
- LCD projector for computer.

Main Focus – Suggested Questions/Strategies for Accomplishing Objectives

- Show the participants how to use the Capture Class feature to help monitor a lab.
- Demonstrate the use of the Capture Class to help the class learn how to create circuits with the Auto-Refresh option.
- Use the Live Presenter feature to have students demonstrate how they built a particular circuit.

Technology Tips

- Many simulations have tools under the **menu**. Explore these with the participants and let them know they should always look at the **menu** options when using LUA simulations.
- Show the participants the LUA script and let them know they, or their kids can learn LUA and code in the Nspire simulation. Use the Edit Script option. TI-Nspire Lua Scripting HQ compasstech.com.au/TNS_Authoring/Scripting/index.html



- Optional: Have participants locate this investigation on the Science Nspired web or search for it under the Content tab in the Nspire software. In both cases they can send it to their handhelds.

Summary Reflection Questions

- Would you use this simulation for a pre-lab? as a summative assessment for a lab? Why?
- How is using this simulation better than the similar PhET simulation?

The TI-Nspire™ CX Navigator™ Classroom**PD Objectives**

- During this activity, participants will role-play and perform various TI-Nspire™ Navigator™ skills.

Materials Needed/Set Up Requirements

- Each pair of participants will need at least two TI-Nspire documents for this activity. You can send the documents to them using Navigator, and have them transfer from their handhelds to the computers they are using; you can provide the documents on a jump drive for each participant to load onto the computers during a break; or you can have them download the TI-Nspire documents from the Math Nspired website.

Main Focus – Suggested Questions/Strategies for Accomplishing Objectives

- The participants will work in pairs during this activity. One participant will play the role of the “teacher” and operate the computer. One participant will play the role of “students” and operate the TI-Nspire handhelds. After they complete the activity, they should change roles and repeat the activity using different files.
- Give the participants a brief overview of the various workspaces in the software. The overview of the workspaces should be just detailed enough so that they understand directions such as “Go to the Documents Workspace”. A more detailed overview will be given in another activity.
- Monitor groups to be certain they are stopping to discuss the various “Reflection” components.

Technology Tips

- The class is created manually. If participants are interested in learning how to upload a CSV file to create classes, they should be directed to the tip sheet Add Classes.
- When logging in to the system, inform participants that handheld screens slightly differ depending on whether USB connection cables or wireless modules are used. The screens shown in the activity result when connected via the USB connection cable, so screens may be slightly different when using wireless modules in the classroom.

Summary Reflection Questions

- How can the TI-Nspire Navigator skills explored in this activity be used to facilitate the teaching and learning of mathematical concepts?
- How can the TI-Nspire Navigator skills explored in this activity be used to engage your students?

Introduction To Data Collection

PD Objectives

- This investigation will introduce data collection with TI-Nspire™ technology by exploring rates of heating and cooling with the Vernier® DataQuest™ application. Participants will design experiments to cause the probe to heat and cool, collecting data at least two times.
- Participants will create a new document, automatically add a DataQuest app by plugging in the EasyLink, identify variables, change the Time and Unit settings, and save the document.
- In the Notes application, participants will use text format options to discuss experiment parameters and to interact with the text. (Optional as they answer questions.)

Materials Needed/Set Up Requirements

- Vernier EasyLink® USB interface and TI Stainless Steel Temperature probe for each participant. (Optional: Vernier EasyTemp™ if needed.)
- Optional: collection of ice and cups, fan, alcohols, liver, and other mechanisms and materials to facilitate cooling and heating.

Main Focus – Suggested Questions/Strategies for Accomplishing Objectives

- Have the participants become aware of the data collection aspects of TI-Nspire™ technology.
- Show the power of TI-Nspire technology as a science tool, using the Notes application in conjunction with the Vernier DataQuest application.
- Note that the rate of heating and cooling is not constant and that it is related to the materials used to heat or cool the probe.
- Participants will need to list the variables in the experiment and then design an experiment to cool the probe. In both cases key words should be formatted with **Bold**, Underline, *Italics* and Color fonts (**fill** or **text**).

Technology Tips

- Follow the instructions. Start a new document! If participants just plug in the probe, it will launch the app in the current document, or pick up with the setting in the current app.
- Use the TI-Nspire™ Teacher Software, not the TI-Nspire™ Navigator™ Teacher Software for presentation. Do not use the TI-Nspire Navigator system to send documents to participants.

Summary Reflection Questions

- Is this a good introduction to the Vernier DataQuest application?
- Would you/could you do this with students?
- What other probe might be used? How?