Dear User,

With funding from The Office of the Secretary of Defense, Military Community & Family Policy, Office of Family Policy/Children and Youth through Kansas State University, a team of writers representing multiple Land Grant Universities (University of Nebraska - Lincoln, University of Wisconsin, University of Illinois, University of Minnesota, University of Arizona, Auburn University, Oklahoma State University, and Iowa State University) have developed this new deployment support curriculum for use with Military youth in grades 5-12 having a parent or loved one in the deployment cycle. You will also notice in the reintegration section of youth activities, several are designed for use with Military youth and their Families.

After surveying University youth development, Department of Defense, and National Guard State Youth Coordinator staff , the curriculum's 20 youth experiences were designed to support development of the following life and resilience skills during pre-deployment, mobilization and reintegration phases of the deployment cycle:

- Communication
- Teamwork
- Self -Responsibility
- Decision Making and
- Problem Solving

At the same time, the youth experiences were designed to support enhancement of youth resilience in the areas of:

- Emotional
- Social
- Family and
- Spiritual (their set of beliefs, principles and values that give them strength)

The specific skills to be developed are listed on the first page of each activity plan. These are the important outcomes of the experience and become the focus of all of the Debriefing and Talk It Over parts of each experience. All of the experiences are set in the context of current areas of science and technology that will be fun for the youth: digital storytelling, engineering our future, exploring our world. Please review the Curriculum Development Grid for a listing of National Educational Standards and 4-H SET Abilities identified for each of the youth experiences.

The youth experiences in this curriculum were pilot tested by non-military volunteers with Military youth in a variety of contexts. Relevant adaptations/revisions were made and they are now presented here for your use.

Additional features:

- On-line volunteer training. Please consider going through this quick series of six modules. It will give you a short orientation to implementing this curriculum with Military youth.

- Many resources for assistance in implementing the activities in each lesson are linked from the curriculum home page.
- A Parent Letter is included with each plan that informs parents about what their youth has been doing during the experience and provides some follow-up questions for family discussion that also reinforce application of the identified life and resilience skills.
- OMK Tech Discovery Tool Kits will be distributed to each state/territory that will contain most of the durable goods that are needed for each of the experiences. These resources are to be available to all users of this curriculum with Military youth and may be scheduled by contacting the State 4-H Military Liaison in your state (www.operationmilitarykids.org/public/states.aspx). Each of the plans clearly articulate where to obtain supplies needed, even those you may need to buy or borrow.

It is important to NOTE: Because of the more technical context of these lessons and the activities involved, you will need a fair amount of planning and preparation time. It is highly encouraged that as part of your preparation you do all of the activities in the lesson plan. This will help you identify areas where the youth may have more questions or need more time, and make sure that you have all of the resources that you will need for the activities. You will also likely need to spend more time orienting and preparing the other volunteers and staff that will be assisting with implementing the activities in the lesson. The more familiar you are with the technical aspects of the experience, the easier it will be for you to focus on developing the life and resilience skills. Please plan accordingly.

The OMK Tech Discovery Curriculum was developed at the University of Minnesota Extension Center for Youth Development through a partnership of the Department of Defense, Office of the Secretary of Defense, Military Community & Family Policy, Office of Family Policy/Children and Youth and the United States Department of Agriculture, National Institute of Food and Agriculture, Institute of Youth, Family and Community, 4-H National Headquarters under Kansas State University special project number 2010-48713-21882.

How Do These Activities Work?

All of the 20 youth experiences follow the same easy to use format.

The first page is the quick glance at the overall plan. The upper right corner has initial information for determining if this experience fits your needs: **Lesson Time, Skill Level, Number of Youth, Deployment Segment, and if an Internet Connection** is required.

Most of the experiences are designed for youth having only a basic level of understanding of the technology used. Plans include an **Enhancement** section that can be used with more advanced skill levels. All experiences are designed for groups of 12 youth. Our research indicates that this is a reasonable expectation for number of older youth at a deployment support event. If you anticipate more youth, please check out another OMK Tech Discovery Tool Kit which will double the number of youth that can be supported. Remember that you will need to also double the amount of supplies you will need to obtain.

Becoming familiar with the **Life Skill, Resilience Skill and Science and Technology Objectives** is necessary as these are the educational foundation for the youth experience. These are the main points that we hope this experience will develop in the youth and they form the main points in the **Debriefing** and **Lets Talk It Over** sections of each lesson plan.

The **Activity Overview** provides insight into the kinds of activities that the youth will be involved with during this experience. The **Shout Out to Youth!** is a 1-2 sentence promotion that you can use for event fliers.

Most of the lesson plans include multiple activities that build upon each other throughout the experiences. This first page includes a **Breakdown of Activities** and about how much time they should take.

Working with your event sponsors:

- We've tried to provide a **Budget Range** for the cost of conducting each of the youth experiences. Sometimes event sponsors will provide these resources when working with youth from their branch of service. In any case, it is not the intent that these costs be passed along to the youth participants.
- An indication is also provided for the amount of **Space Needed** for the experience. Either work early with your event sponsor to acquire the amount of space needed for the activities in the lesson ~~y~~ or select your experience based upon the amount of space that you will be provided.

The flow of each lesson plan is the same:

1. Before the Event
    a. Tasks for the Lead Volunteer/Staff
    b. Do Ahead
    c. Copies to Be Made

d. Items that are Needed from the OMK Tech Discovery Tool Kit
e. Items that are Needed from the OMK Yellow Ribbon Tool Kit
f. Items that are Needed from the Mobile Technology Lab
g. Things that will Need to be Bought or Borrowed
    i. This section is arranged by activity and includes the items from the various Tool Kits (duly noted) to help you arrange your supplies and space

2. Day of the Event
    a. Roles for Uniformed Service Member
        i. Experience has shown that having a uniformed Service Member present to assist with the implementation of the lesson's activities creates opportunities for the youth become more comfortable with military personnel, opens lines of communication for asking questions they might not want to ask their Military Service Member, provides opportunities for the Service Member to share their experience in the Service.
    b. Roles for Volunteers
    c. Things to Get Ready Before the Youth Arrive
    d. Set Up Your Space to be Welcoming and Inviting as the youth arrive

3. What To Do
    a. As the Youth Arrive
        i. Be ready to engage the early arrivals in activity until you're ready to begin
    b. Icebreaker
        i. Help the youth get to know each other. For some, this may be the first time they have met with other teens having a similar experience with a parent/loved one's deployment.
    c. Debriefing Questions
        i. You will need to adapt/modify the questions you pose based upon the experiences of the group, but here are some ideas to get you started. This debriefing is an important building block for the rest of the lesson plan.
    d. Just before the end of the youth's experience, there is a **Talk It Over**
        i. **This is the point everything has been building towards. This is the most important part of each experience. This design is based upon an experiential learning model that begins with general observation and sharing of experiences and moves through the debriefing process getting to the place where youth are able to identify and generalize what they have learned about the Life and Resilience skills that they can apply to their lives here and now.**
    e. Extend the Activity
        i. If you have more experienced youth or finish early, here are some ideas for the youth to explore

4. Post Event
    a. A list has been started to include the things that the lead volunteer/staff should accomplish after the youth have departed.

b. Be sure to check with the Military and OMK Points of Contact prior to the event to see if they have additional needs prior to your departure for the day.

Being well prepared is your key for successfully facilitating the youths learning experiences. The more prepared you feel, the more comfortable you will be in supporting the other volunteers/staff and youth.

HAVE FUN!!!

The OMK Tech Discovery Curriculum was developed at the University of Minnesota Extension Center for Youth Development through a partnership of the Department of Defense, Office of the Secretary of Defense, Military Community & Family Policy, Office of Family Policy/Children and Youth and the United States Department of Agriculture, National Institute of Food and Agriculture, Institute of Youth, Family and Community, 4-H National Headquarters under Kansas State University special project number 2010-48713-21882.

OMK Tech Discovery Curriculum Development Grid

Activity	Stage of Deployment	Life Skills	Resilience Skills	4-H SET Abilities	National Educational Standard
1. Become Your Own Emoticon	Pre-Deployment	• Communication • Decision Making • Self-responsibility	• Emotional • Social	• Communicate, Demonstrate • Draw, Design • Use Tools	**NT.K-12.4 TECHNOLOGY COMMUNICATION TOOLS** **Youth should utilize:** • Telecommunications to collaborate, publish, and interact with peers, experts, and other audiences • A variety of media and formats to communicate information and ideas effectively to multiple audiences
2. Navigating My World	Pre-Deployment	• Communication • Teamwork • Self-responsibility	• Emotional • Social • Spiritual	• Communicate, Demonstrate • Interpret, Analyze, Reason • Measure • Use Tools	**NSS-G.K-12.1 THE WORLD IN SPATIAL TERMS** **Youth should understand how to:** • Use maps and other geographic representations, tools, and technologies to acquire, process, and report information from a spatial perspective • Use mental maps to organize information about people, places, and environments in a spatial context • Analyze the spatial organization of people, places, and environments on Earth's surface
3. Perspective Through Another Lens	Pre-Deployment	• Teamwork • Decision Making	• Social • Spiritual	• Communicate, Demonstrate • Use Tools • Observe • Collaborate	**NA-VA.5-8.1 UNDERSTANDING AND APPLYING MEDIA, TECHNIQUES, AND PROCESSES** **Youth should be able to:** • Select techniques, and processes, that reflect effectively communicating ideas • Understand and use the qualities and characteristics of art media, techniques, and processes to enhance communication of their experiences and ideas *continued*

					NA-VA.9-12.1 UNDERSTANDING AND APPLYING MEDIA, TECHNIQUES, AND PROCESSES **Youth should be able to:** • Apply media, techniques, and processes with sufficient skill, confidence, and sensitivity that their intentions are carried out in their artworks • Conceive and create works of visual art that demonstrate an understanding of how the communication of their ideas relates to the media, techniques, and processes they use
4. Rise to the Challenge	Pre-Deployment	• Communication • Problem Solving • Teamwork	• Emotional • Social • Family • Spiritual	• Build, Construct • Collaborate • Hypothesize • Test • Interpret, Analyze, Reason • Predict • Measure • Problem Solve • Redesign • Use Tools • Communicate, Demonstrate	**NS.5-8.1, NS.9-12.1 SCIENCE AS INQUIRY** **Youth should develop:** • The abilities necessary to do scientific inquiry • Understandings about scientific inquiry
5. Wind Energy Workout	Pre-Deployment	• Communication • Problem Solving • Teamwork	• Emotional • Social • Family • Spiritual	• Evaluate • Infer • Build, Construct • Collaborate • Communicate, Demonstrate *continued*	**NS.5-8.1, NS.9-12.1 SCIENCE AS INQUIRY** **Youth should develop:** • The abilities necessary to do scientific inquiry • Understandings about scientific inquiry *continued*

				• Design Solutions • Draw, Design • Hypothesize • Interpret, Analyze, Reason • Invent, Implement Solutions • Observe • Predict • Problem Solve • Question • Redesign • Test • Troubleshoot • Use Tools	**NS.5-8.2 PHYSICAL SCIENCE** **Youth should develop an understanding of:** • Properties and changes of properties in matter • Motions and forces • The transfer of energy **NS.9-12.2 PHYSICAL SCIENCE** **Youth should develop an understanding of:** • The structure of atoms • The structure and properties of matter • Chemical reactions • Motions and forces • The conservation of energy and increase in disorder • The interactions of energy and matter
6. Find Your Way	Mobilization	• Problem Solving • Teamwork • Self-responsibility	• Emotional • Social	• Communicate, Demonstrate • Measure • Problem Solve • Use Tools • Collaborate	**NSS-G.K-12.1 THE WORLD IN SPATIAL TERMS** **Youth should understand how to:** • Use maps and other geographic representations, tools, and technologies to acquire, process, and report information from a spatial perspective • Use mental maps to organize information about people, places, and environments in a spatial context • Analyze the spatial organization of people, places, and environments on Earth's surface
7. My Social Network 1: I Need My Privacy!	Mobilization	• Communication • Decision Making • Self-responsibility	• Social • Family • Spiritual	• Communicate, Demonstrate • Categorize, Order, Classify • Evaluate • Question • Use Tools	**NT.K-12.2 SOCIAL, ETHICAL, AND HUMAN ISSUES** **Youth should:** • Understand the ethical, cultural, and societal issues related to technology • Practice responsible use of technology systems, information, and software • Develop positive attitudes toward technology uses that support lifelong learning, collaboration, personal pursuits, and productivity

8. My Social Network 2: Talk to Me!	Mobilization	• Communication • Decision Making • Self-responsibility	• Emotional • Social • Family • Spiritual	• Communicate, Demonstrate • Interpret, Analyze, Reason • Categorize, Order, Classify • Evaluate • Question • Use Tools	**NL-ENG.K-12.4 COMMUNICATION SKILLS** **Youth should be able to:** • Adjust the use of spoken, written, and visual language (e.g., conventions, style, vocabulary) to communicate effectively with a variety of audiences and for different purposes
9. My World − My Direction!	Mobilization	• Communication • Problem Solving • Teamwork	• Emotional • Social • Family • Spiritual	• Communicate, Demonstrate • Problem Solve • Use Tools • Collaborate • Collect Data • Measure • Compare, Contrast • Draw, Design	**NSS-G.K-12.1 THE WORLD IN SPATIAL TERMS** **Youth should understand how to:** • Use maps and other geographic representations, tools, and technologies to acquire, process, and report information from a spatial perspective • Use mental maps to organize information about people, places, and environments in a spatial context • Analyze the spatial organization of people, places, and environments on Earth's surface
10. Rivets and Steel	Mobilization	• Communication • Problem Solving • Teamwork	• Emotional • Social • Family • Spiritual	• Communicate, Demonstrate • Collaborate • Build, Construct • Design Solutions • Evaluate • Hypothesize • Interpret, Analyze, Reason • Observe • Predict • Problem Solve • Test • Troubleshoot • Use Tools	**NS.5-8.1, NS.9-12.1 SCIENCE AS INQUIRY** **Youth should develop:** • The abilities necessary to do scientific inquiry • Understandings about scientific inquiry **NS.9-12.5 SCIENCE AND TECHNOLOGY** **Youth should develop:** • An understanding of technological design and engineering **NS.9-12.2 PHYSICAL SCIENCE** **Youth should develop an understanding of:** • Motions and forces • The interactions of energy and matter

11. Robot Rovers	Mobilization	• Communication • Problem Solving • Teamwork	• Social • Family	• Communicate, Demonstrate • Collaborate • Evaluate • Hypothesize • Categorize, Order, Classify • Build, Construct • Use Tools • Design Solutions • Interpret, Analyze, Reason • Model, Graph, Use Numbers • Predict • Problem Solve • Redesign • Test • Troubleshoot • Use Tools	**NS.5-8.5 SCIENCE AND TECHNOLOGY** **Youth should develop:** • A basic understanding of technological design and engineering
12. Threaded Thoughts	Mobilization	• Communication • Self-responsibility	• Emotional • Social • Family • Spiritual	• Communicate, Demonstrate • Interpret, Analyze, Reason • Question • Evaluate • Use Tools	**NA-VA.5-8.1 UNDERSTANDING AND APPLYING MEDIA, TECHNIQUES, AND PROCESSES** **Youth should be able to:** • Select media, techniques, and processes, analyze what makes them effective or not effective in communicating ideas, and reflect upon the effectiveness of their choices • Intentionally take advantage of the qualities and characteristics of art media, techniques, and processes to enhance communication of their experiences and ideas *continued*

					NA-VA.9-12.1 UNDERSTANDING AND APPLYING MEDIA, TECHNIQUES, AND PROCESSES **Youth should be able to:** • Apply media, techniques, and processes with sufficient skill, confidence, and sensitivity that their intentions are carried out in their artworks • Conceive and create works of visual art that demonstrate an understanding of how the communication of their ideas relates to the media, techniques, and processes they use **NL-ENG.K-12.4 COMMUNICATION SKILLS** **Youth should be able to:** • Use spoken, written, and visual language (e.g., conventions, style, vocabulary) to communicate effectively with a variety of audiences and for different purposes **NT.K-12.2 SOCIAL, ETHICAL, AND HUMAN ISSUES** **Youth should:** • Understand the ethical, cultural, and societal issues related to technology • Practice responsible use of technology systems, information, and software • Develop positive attitudes toward technology uses that support lifelong learning, collaboration, personal pursuits, and productivity *continued*

					NA-T.5-8.3 DESIGNING BY DEVELOPING ENVIRONMENTS FOR IMPROVISED AND SCRIPTED SCENES **Youth should be able to:** • Explain the functions and interrelated nature of scenery, properties, lighting, sound, costumes, and makeup in creating an environment appropriate for the drama • Analyze improvised and scripted scenes for technical requirements • Develop focused ideas for the environment using visual elements (line, texture, color, space), visual principles (repetition, balance, emphasis, contrast, unity), and aural qualities (pitch, rhythm, dynamics, tempo, expression) from traditional and nontraditional sources • Work collaboratively and safely to select and create elements of scenery, properties, lighting, and sound to signify environments, and costumes and makeup to suggest character
13. Avatar Adventure	Reintegration: Youth	• Communication • Decision Making • Self-responsibility	• Emotional • Social • Family	• Communicate, Demonstrate • Collect Data • Evaluate • Use Tools	**NA-T.9-12.1 SCRIPT WRITING BY PLANNING AND IMPROVISING, WRITING AND REFINING SCRIPTS BASED ON PERSONAL EXPERIENCE AND HERITAGE, IMAGINATION, LITERATURE, AND HISTORY** **Youth should be able to:** • Construct imaginative scripts and collaborate with actors to refine scripts so that story and meaning are conveyed to an audience **NT.K-12.4 TECHNOLOGY COMMUNICATION TOOLS** **Youth should be able to use:** • Telecommunications to collaborate, publish, and interact with peers, experts, and other audiences • A variety of media and formats to communicate information and ideas effectively to multiple audiences *continued*

					NA-T.5-8.3 DESIGNING BY DEVELOPING ENVIRONMENTS FOR IMPROVISED AND SCRIPTED SCENES **Youth should be able to:** • Explain the functions and interrelated nature of scenery, properties, lighting, sound, costumes, and makeup in creating an environment appropriate for the drama • Analyze improvised and scripted scenes for technical requirements • Develop focused ideas for the environment using visual elements (line, texture, color, space), visual principles (repetition, balance, emphasis, contrast, unity), and aural qualities (pitch, rhythm, dynamics, tempo, expression) from traditional and nontraditional sources • Work collaboratively and safely to select and create elements of scenery, properties, lighting, and sound to signify environments, and costumes and makeup to suggest character
14. Mapping My World	Reintegration: Youth	• Communication • Decision Making • Self-responsibility	• Emotional • Social • Family • Spiritual	• Communicate, Demonstrate • Collect Data • Interpret, Analyze, Reason • Invent, Implement Solutions • Use Tools	**NSS-G.K-12.1 THE WORLD IN SPATIAL TERMS** **Youth should understand how to:** • Use maps and other geographic representations, tools, and technologies to acquire, process, and report information from a spatial perspective • Use mental maps to organize information about people, places, and environments in a spatial context • Analyze the spatial organization of people, places, and environments on Earth's surface

15. Rockin' My World	Reintegration: Youth	• Communication • Teamwork • Decision Making • Self-responsibility	• Emotional • Social • Family • Spiritual	• Communicate, Demonstrate • Build, Construct • Collaborate • Compare, Contrast • Invent, Implement Solutions • Problem Solve • Categorize, Order, Classify • Use Tools	**NA.5-8.9 UNDERSTANDING MUSIC IN RELATION TO HISTORY AND CULTURE** **Youth should be able to:** • Describe distinguishing characteristics of representative music genres and styles from a variety of cultures • Classify by genre and style (and, if applicable, by historical period, composer, and title) a varied body of exemplary (that is, high-quality and characteristic) musical works, and explain the characteristics that cause each work to be considered exemplary • Compare, in several cultures of the world, the functions music serves, roles of musicians (e.g., lead guitarist in a rock band, composer of jingles for commercials, singer in Peking opera), and conditions under which music is typically performed
16. Roller Coaster Rally	Reintegration: Youth	• Communication • Problem Solving • Teamwork • Decision Making	• Social • Spiritual	• Communicate, Demonstrate • Build, Construct • Collaborate • Collect Data • Compare, Contrast • Design Solutions • Develop Solutions • Draw, Design • Evaluate • Hypothesize • Invent, Implement Solutions • Measure • Optimize • Predict • Problem Solve *continued*	**NS.5-8.1, NS.9-12.1 SCIENCE AS INQUIRY** **Youth should develop:** • The abilities necessary to do scientific inquiry • Understandings about scientific inquiry **NS.5-8.2 PHYSICAL SCIENCE** **Youth should develop an understanding of:** • Motions and forces • The transfer of energy **NS.9-12.2 PHYSICAL SCIENCE** **Youth should develop an understanding of:** • The structure and properties of matter • Motions and forces • The conservation of energy and increase in disorder • The interactions of energy and matter *continued*

				• Redesign • Test • Troubleshoot • Use Tools	**NS.9-12.5 SCIENCE AND TECHNOLOGY** **Youth should develop:** • The abilities of technological design • Understandings about science and technology
17. Video Talk Show	Reintegration: Youth	• Communication • Teamwork • Decision Making	• Emotional • Family	• Communicate, Demonstrate • Organize, Order, Classify • Draw, Design • Redesign • Troubleshoot • Test • Use Tools	**NA-T.5-8.1 SCRIPT WRITING BY THE CREATION OF IMPROVISATIONS AND SCRIPTED SCENES BASED ON PERSONAL EXPERIENCE AND HERITAGE, IMAGINATION, LITERATURE, AND HISTORY** **Youth should be able to:** • Individually and in groups, create characters, environments, and actions • Refine and record dialogue and action **NT.K-12.4 TECHNOLOGY COMMUNICATION TOOLS** **Youth should be able to:** • Use a variety of media and formats to communicate information and ideas effectively to multiple audiences **NA-T.5-8.3 DESIGNING BY DEVELOPING ENVIRONMENTS FOR IMPROVISED AND SCRIPTED SCENES** **Youth should be able to:** • Analyze improvised and scripted scenes for technical requirements • Work collaboratively and safely to select and create elements of scenery, properties, lighting, and sound to signify environments, and costumes and makeup to suggest character
18. The Great Rocket Car Challenge	Reintegration: Youth & Family	• Communication • Problem Solving • Teamwork • Decision Making	• Social • Family • Spiritual	• Communicate, Demonstrate • Build, Construct • Collaborate *continued*	**NS.5-8.1, NS.9-12.1 SCIENCE AS INQUIRY** **Youth should develop:** • The abilities necessary to do scientific inquiry • Understandings about scientific inquiry *continued*

				• Collect Data • Compare, Contrast • Design Solutions • Develop Solutions • Draw, Design • Evaluate • Hypothesize • Invent, Implement Solutions • Measure • Optimize • Predict • Problem Solve • Redesign • Test • Troubleshoot • Use Tools	**NS.5-8.2 PHYSICAL SCIENCE** **Youth should develop an understanding of:** • Properties and changes of properties in matter • Motions and forces • The transfer of energy **NS.9-12.2 PHYSICAL SCIENCE** **Youth should develop an understanding of:** • The structure and properties of matter • Motions and forces • The conservation of energy and increase in disorder • The interactions of energy and matter
19. Re-Engineering Our Family	Reintegration: Youth & Family	• Communication • Decision Making • Self-responsibility	• Social • Family	• Communicate, Demonstrate • Collect Data • Collaborate • Organize, Order, Classify • Use Tools • Summarize	**NT.K-12.4 TECHNOLOGY COMMUNICATION TOOLS** **Youth should be able to use:** • Telecommunications to collaborate, publish, and interact with peers, experts, and other audiences • A variety of media and formats to communicate information and ideas effectively to multiple audiences

20. Team VoiceThread	Reintegration: Youth & Family	• Communication • Decision Making	• Emotional • Family • Spiritual	• Communicate, Demonstrate • Interpret, Analyze, Reason • Question • Evaluate • Use Tools	**NA-VA.5-8.1 UNDERSTANDING AND APPLYING MEDIA, TECHNIQUES, AND PROCESSES** **Youth should be able to:** • Select media, techniques, and processes, analyze what makes them effective or not effective in communicating ideas, and reflect upon the effectiveness of their choices • Intentionally take advantage of the qualities and characteristics of art media, techniques, and processes to enhance communication of their experiences and ideas **NA-T.5-8.3 DESIGNING BY DEVELOPING ENVIRONMENTS FOR IMPROVISED AND SCRIPTED SCENES** **Youth should be able to:** • Explain the functions and interrelated nature of scenery, properties, lighting, sound, costumes, and makeup in creating an environment appropriate for the drama • Analyze improvised and scripted scenes for technical requirements • Develop focused ideas for the environment using visual elements (line, texture, color, space), visual principles (repetition, balance, emphasis, contrast, unity), and aural qualities (pitch, rhythm, dynamics, tempo, expression) from traditional and nontraditional sources • Work collaboratively and safely to select and create elements of scenery, properties, lighting, and sound to signify environments, and costumes and makeup to suggest character **NL-ENG.K-12.4 COMMUNICATION SKILLS** **Youth should be able to:** • Adjust the use of spoken, written, and visual language (e.g., conventions, style, vocabulary) to communicate effectively with a variety of audiences and for different purposes *continued*

					NA-VA.9-12.1 UNDERSTANDING AND APPLYING MEDIA, TECHNIQUES, AND PROCESSES **Youth should be able to:** • Apply media, techniques, and processes with sufficient skill, confidence, and sensitivity that their intentions are carried out in their artworks • Conceive and create works of visual art that demonstrate an understanding of how the communication of their ideas relates to the media, techniques, and processes they use **NT.K-12.4 TECHNOLOGY COMMUNICATION TOOLS** **Youth should be able to use:** • Telecommunications to collaborate, publish, and interact with peers, experts, and other audiences • A variety of media and formats to communicate information and ideas effectively to multiple audiences **NT.K-12.2 SOCIAL, ETHICAL, AND HUMAN ISSUES** **Youth should be able to:** • Understand the ethical, cultural, and societal issues related to technology • Practice responsible use of technology systems, information, and software • Develop positive attitudes toward technology uses that support lifelong learning, collaboration, personal pursuits, and productivity
				SOURCE: 4-H Science, Engineering and Technology (SET) Abilities, California	SOURCE: Adapted from Education World

INQUIRY 101

Thinking like a scientist

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SCIENCE IS A PROCESS CALLED INQUIRY

From the beginning of human history, natural phenomena have puzzled people and caused them to ask questions. Scientific inquiry is a process for answering these questions through investigation. Scientific inquiry is not a rigid set of procedures, but rather a broad approach to investigation that begins with questions: "Why? What's going on? How is this explained?" and leads an investigator to reasoned, evidence-based answers to those questions.

Also called "The Scientific Method" or "The Process of Science," inquiry is a logical and rational order of steps by which scientists come to conclusions about the world around them. Through a careful sequence of observations, questions, hypotheses, data collection, and logical reasoning, the process of inquiry serves as a helpful framework that helps to ensure a scientist can be confident in the answers he or she finds. Used in science education, it also helps to ensure that young people are engaged and interested in the research process, and teaches them how science is done.

After observing monarch larvae in a field of milkweed, youth naturally become curious and ask questions about what they see.

INQUIRY TEACHES SCIENCE SKILLS

The process of inquiry can be both quite simple (ask questions, methodically pursue answers) and overwhelmingly complex (a 10-step process with piles of data). When people learn through inquiry, they are actively engaged in the construction of ideas and explanations (National Research Council, 2000). Instead of *learning about* science, they *learn by doing* science. When students take on the role of scientist, they come to understand the very nature of scientific inquiry. They begin to acquire the thinking skills important in everyday life, and may even set on a course toward pursuing careers in science (National Research Council, 2000).

By participating in inquiry-based experiences, learners make observations of the world around them which leads them to ask questions about what they see. They imagine possible explanations, or hypotheses, for their questions, and gather evidence that might lead them to favor one explanation over another. Ideally, they design experiments or conduct other kinds of study to answer their questions, and to share their findings with their peers. Inquiry is often cyclical, with reflections on the experience sparking new questions for study.

A STEPWISE PROCESS

Though there are many components and steps, inquiry boils down to the process of asking questions based on observations and methodically pursuing answers (See Figure 1). Across all these steps, a scientist often draws on creative thinking to challenge assumptions, draw connections, generate ideas, realize new insights, and create new procedures.

- **Observe & Wonder:** Inquiry begins when a person focuses attention on the world around them and uses their senses to experience what's there. They may compare what they see to what they already know or to other things they see. They may record notes or illustrations about their observations in a journal.

- **Question:** Observations naturally trigger curiosity. At this stage, observers become scientists. When they pose questions, they may challenge assumptions, synthesize observations, or infer that what they see involves more than meets the eye. Though scientists may ask thousands of questions, they must narrow down their specific query to pursue answers.

- **Develop Hypotheses:** Scientists will use logical reasoning to theorize about what answers they might find, and whether and why they think that some of these answers might be more likely than others. Often, scientists will identify factors they think will influence the possible answers.

- **Plan & Test:** In this stage, scientists organize a systematic method to collect data that will confirm or contradict their hypotheses. They may use tools such as thermometers, microscopes, chemical tests, binoculars, or they may just use their own eyes and ears to collect information. They must remain as objective and consistent as possible through the data collection process to ensure their evidence is sound, and not biased in some way.

- **Analyze & Interpret:** Once the data are gathered, scientists summarize their data to report statistics or evidence about what they've found. This kind of analysis can include both very simple summaries or complex analyses that help determine the statistical significance of the data. Then, scientists will apply their best logical reasoning to give the information meaning.

- **Conclude & Report:** When considering all the data, scientists determine which hypothesis is best supported by the evidence. They often will use graphs or tables to explain to others what they found and what they think their findings mean.

- **Reflect & Rethink:** Scientists must continually re-evaluate their assumptions, consider alternatives, identify problems with their process, seek input, troubleshoot, and ask more questions. At any point, they may rethink their investigation plan and take a new direction with new questions. The diagram's dotted arrows illustrate this critical reflection.

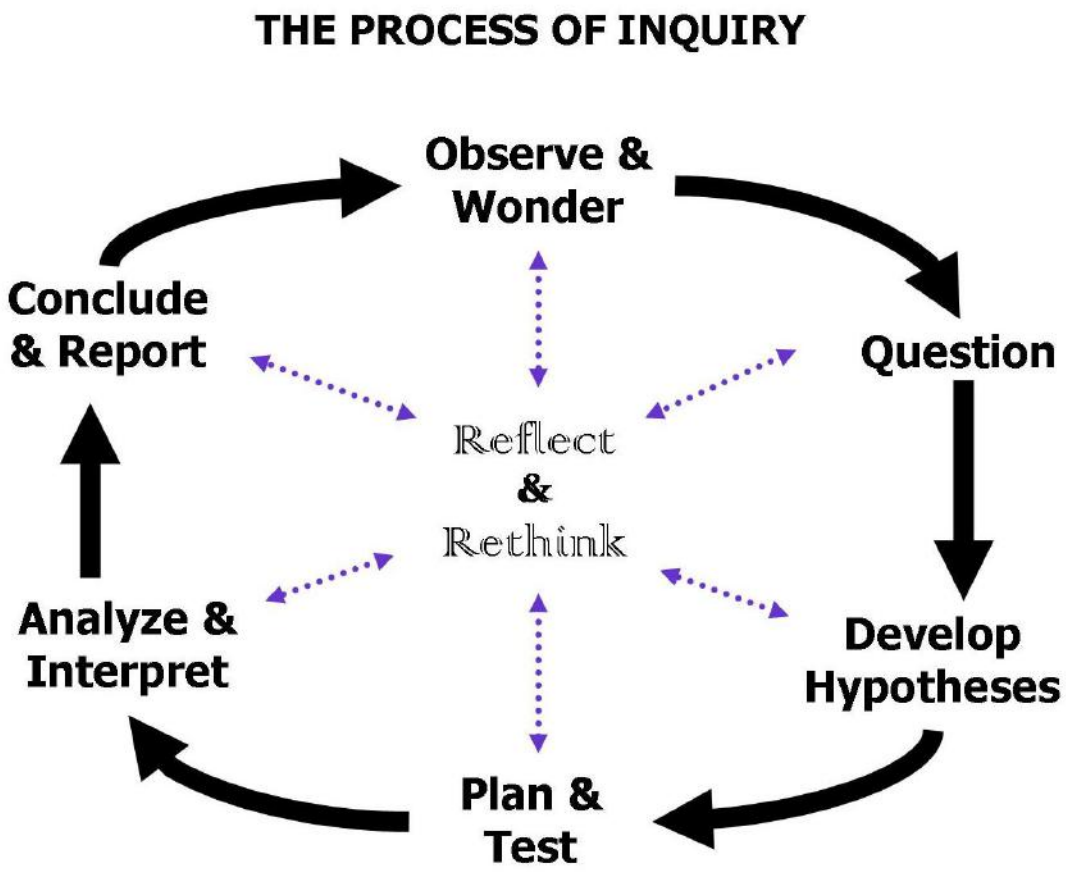

FIGURE 1. Scientific discoveries are made through the process of inquiry, though scientists often use the word "research" or "the scientific method" to describe what they do. Inquiry involves detailed examination of phenomena with the goal of discovering and interpreting new knowledge, whether the knowledge is new to human-kind, to a small group of people, or even just to the person doing the research.

FACILITATOR SKILLS THAT FOSTER INQUIRY

Inquiry is learner-driven, not teacher driven, so the instructor must take a back seat to his or her participants' curiosity. The instructor simply facilitates the learning process, so a lesson plan for an inquiry-learning activity might look more like a "facilitation plan" in which the instructor plans ahead for the many different ways an activity may turn out ("Step-by-step facilitation-plan creation," 2004). Such a plan helps retain the focus on the essential learning points and habits of mind the students should take away from the experience while still allowing the learner to drive the process.

Facilitating inquiry experiences requires flexibility, patience, tolerance of ambiguity, and an emphasis on student skill building. When learner-driven inquiry takes place, the instructor becomes a learner, too. And not just in the content area, but by gaining a deeper understanding of his/her students' thinking processes as well as the process of inquiry itself.

INQUIRY AND THE K-12 STANDARDS

The National Science Education Standards recognize three essential aspects to science learning: learning essential scientific concepts and principles, learning skills necessary to do science, and learning about the process of science (National Research Council, 2000). The process of inquiry, then, is both a teaching method and a learning goal. Though specific standards increase in complexity from Kindergarten through Grade 12, all age levels must ask questions, plan and implement investigations, and communicate results.

Each step in the process of inquiry is crucial for developing a clear grasp of science, but any one lesson or activity might not embody all the steps. Depending on the learning setting, it may not be possible or appropriate to carry out the entire learner-driven inquiry process. In some cases, it may be useful for the instructor to guide the process by providing a provocative question or a pre-determined set of data in the interests of dedicating more learning time to other steps in the inquiry process.

SUMMARY

True inquiry learning is driven, as much as possible, by a learner's questions rather than by what the instructor wants to teach. At its core, it draws on and feeds a learner's natural curiosity. Through inquiry-based experiences, learners develop essential skills: those that help them learn how to learn.

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ADDITIONAL RESOURCES

Center for Inquiry-Based Learning, Duke University, http://tasc.pratt.duke.edu/index.php

Inquiry Page, University of Illinois, Urbana-Champaign, http://inquiry.illinois.edu/index.php

Institute for Inquiry, Exploratorium, San Francisco, CA, http://www.exploratorium.edu/ifi/

Cornell Lab of Ornithology, http://www.birds.cornell.edu/birdsleuth/inquiry-resources

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iPad 2 App List

2012 Original Tool Kit

Paid Apps

- Art Studio
- Bridge Basher
- FaceYourManga Avatar
- Garage Band
- GeoBee Challenge
- iMovie
- iWind Turbine
- My Photo Story
- Offline Topo Maps
- Print Central Pro
- World Atlas & Maps
- Geo Walk HD
- Faces iMake
- Beautiful Planet HD
- Numbl
- Chinese Checkers

Free Apps

- Google Earth
- Rollercoaster Extreme HD
- Animation Creator HD Lite
- Story Maker HD
- MyPad 2
- Facebook
- Skype for iPad
- Vtok
- Pandora
- Spotify
- Voice Thread

2014 Tool Kit Addition

Paid Apps

- Simple Mind (Full Version)
- Barefoot World Atlas
- Garden Planner HD
- Audubon Insects & Spiders
- iSurvival – Wilderness Survival Manual HD
- Keynote
- Scrabble

Free Apps

- Flower Garden
- Garden Dash
- A Plant's Life, Grow Plants 7 Share with Friends
- Vegetable Planting Calendar
- SKIT!
- Ancestry
- World Atlas HD
- Workouts
- Words with Friends
- Family Feud & Friends
- Scramble with Friends
- Your Move Board Games: Live Backgammon, Yatzu Dice & More
- Animal Kingdom Free Edition: Find the Difference
- YouTube

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