

Equipped for the Future Learn Through Research Performance Continuum

PERFORMANCE LEVEL 1

Learn Through Research

How adults at Level 1 Learn Through Research:

- Pose a question to be answered or make a prediction about objects or events.
- Use multiple lines of inquiry to collect information
- Organize, evaluate, and analyze findings
- Interpret and communicate findings

Level 1 Indicators

Use Key Knowledge, Skills, and Strategies

Adults performing at Level 1 can:

- Demonstrate an understanding of research as a process of gathering and making sense of information in order to meet a specified purpose, and pose a simple question or make a simple prediction that can be adequately researched using a few familiar resources
- Identify more than one familiar source of information, and gather a small store of information from each, using multiple simple strategies such as drawing on personal experience and prior knowledge; asking questions; listening to spoken or recorded input of others; reading simple text; taking notes; and using illustrations, simple textual aids (table of contents, index) and context clues to support text comprehension.
- Evaluate the relevance and usefulness of collected information to the research question, and integrate relevant information with prior knowledge;
- Use a few simple strategies to monitor effectiveness of inquiry process such as trial and error, further questioning and seeking suggestions; and adjust approach as necessary based on feedback.
- Communicate findings related to the research question through brief but accurate oral restatement/reports or simple visual displays

Show Fluency, Independence, and Ability to Perform in a Range of Settings

Adults performing at Level 1 can Learn Through Research, with noticeable effort and some difficulty and hesitation, and supported by significant guidance, direction and prompting, to accomplish well defined and highly structured tasks that include multiple simple steps and require limited (but some) prediction or judgment, in one or two comfortable and familiar settings

Level 1 Examples of Proficient Performance

Adults performing at Level 1 can Learn Through Research to accomplish a variety of goals, such as:

- Develop advice about how women can effectively balance employment and family life
- Develop a list of most appropriate and popular topics for parent education classes
- Report to co-workers about on-the-job health and safety guidelines

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PERFORMANCE LEVEL 2

Learn Through Research

How adults At Level 2 Learn Through Research:

- Pose a question to be answered or make a prediction about objects or events.
- Use multiple lines of inquiry to collect information
- Organize, evaluate, and analyze findings
- Interpret and communicate findings

Level 2 Indicators

Use Key Knowledge, Skills, and Strategies

Adults performing at Level 2 can:

- Demonstrate an understanding of research as a process of gathering and making sense of information in order to meet a specified purpose, and pose a question or make a prediction that can be adequately researched using a range of resources
- Identify several familiar and some less familiar sources of information, and gather a small store of information from each, using multiple strategies such as drawing on prior/”working” content knowledge; asking a number of initial and follow-up questions; using internet search engines and navigating some fairly simple websites; listening to spoken or recorded input of others; interpreting simple charts and graphs; reading some longer or multi-part texts (magazine and newspaper articles, books); taking notes; and adjusting reading strategies and using a range of textual aids (table of contents, index, skimming chapter titles and bold headings) and context to support text comprehension.
- Restate, paraphrase and summarize information from several sources; evaluate its relevance and usefulness to the research question through such strategies as comparison/contrast and drawing simple analogies; and integrate relevant information with prior knowledge
- Use a range of simple strategies to monitor effectiveness of inquiry process such as interim summary and evaluation of findings, solicitation of external “expert” review, and some prediction based on recognition of patterns in data; and adjust approach as necessary based on feedback.
- Communicate findings related to the research question through accurate oral or written summaries or presentations with visual displays

Show Fluency, Independence, and Ability to Perform in a Range of Settings

Adults performing at Level 2 can Learn Through Research, with focus, relative comfort and little difficulty, and supported by limited (mostly initial) guidance and direction, to accomplish fairly well defined and structured tasks that include multiple steps and require prediction or judgment, in a range of familiar and some less familiar settings

Level 2 Examples of Proficient Performance

Adults performing at Level 2 can Learn Through Research to accomplish a variety of goals, such as:

- Find out what individuals can do to reduce global warming
- Gather information at a Community College Job Fair about local employment and training opportunities
- Determine what items to include in a family first aid kit
- Find an automobile that best fits one’s needs and costs no more than \$ 3,000
- Compile information about a particular job and decide whether or not to apply for it
- Develop options for further education/training after completion of an ESOL program

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PERFORMANCE LEVEL 3

Learn Through Research

How adults at Level 3 Learn Through Research:

- Pose a question to be answered or make a prediction about objects or events.
- Use multiple lines of inquiry to collect information
- Organize, evaluate, and analyze findings
- Interpret and communicate findings

Level 3 Indicators

Use Key Knowledge, Skills, and Strategies

Adults performing at Level 3 can:

- Demonstrate an understanding of research as a process of gathering and making sense of information in order to meet a specified purpose, and pose a complex (sometimes novel) but precise question that allows for purposeful development and implementation of a coherent inquiry plan using multiple resources
- Identify a range of familiar and novel sources of information, and gather information from each, using a range of sophisticated strategies such as designing and carrying out fairly simple experiments; developing and administering structured questionnaires and interviews; using multiple search engines and navigating complex websites; listening to long presentations; taking extensive notes and developing outlines; interpreting complex charts and graphs; and reading complex, multipart text (including bilingual sources) and adjusting strategies as needed to enhance comprehension
- Analyze (using strategies such as classifying and categorizing) and synthesize (drawing some inferences, conclusions and generalizations) information from multiple sources; evaluate its relevance and usefulness to the research question through a wide range of strategies such as cause/effect analysis, drawing extensive analogies, and prediction; and integrate relevant information with prior knowledge
- Use a range of strategies to monitor effectiveness of inquiry process such as interim summary and evaluation of findings, verification with multiple lines of inquiry, and prediction based on recognition of patterns in data; and adjust approach as necessary based on feedback.
- Communicate findings related to the research question through extensive oral or written reports, complex graphics, simulations or computer models

Show Fluency, Independence, and Ability to Perform in a Range of Settings

Adults performing at Level 3 can Learn Through Research with ease, speed and little effort, taking initiative and needing little guidance (sometimes offering information or assistance to others) to accomplish complex, minimally-structured tasks that require prediction or judgment, in a variety of familiar and less familiar settings

Level 3 Example of Proficient Performance

Adults performing at Level 3 can Learn Through Research to accomplish a variety of goals, such as:

- Compare leading presidential candidates and decide which one to vote for, based on that person's positions on key issues and likelihood to address concerns in your community
- Develop organizational policies and a program plan for a new neighborhood adult learning center
- Make a decision about the best way to provide care for an elder who can no longer care for her/himself at home
- Write a guide to (prepare online resources for a website concerning) local job training and employment opportunities in a particular community

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How to Read the EFF Performance Continuum for
Learn Through Research

Each performance level of the EFF Performance Continuum for each EFF Standard is divided into four sections:

Section 1: The Definition of the Standard

Section 1 is the definition of the Standard. The definition of the standard in the components of performance is a useful tool for communicating to adult learners and their teachers the essential features of the construct for each standard. By “unmasking the construct” in this way (making it clear how the skills of learning through research are defined), adult learners are better able to articulate their own learning goals for improving proficiency and teachers are better able to focus learning and instructional activities that build toward the goal of increasing ability to Learn Through Research to accomplish everyday activities.

The definition of the EFF Standard Learn Through Research is repeated in the same form at each level of the continuum. This repetition serves as a reminder that the integrated skill process defined by the components of performance for this standard is constant across all levels, from novice to expert levels of performance. Thus, the standard does not change from level to level. It remains a consistent focal point for learning and instruction. What changes from level to level is the growth and complexity of the underlying knowledge base and the resulting increases in fluency and independence in using the standard to accomplish an increasing range and variety of tasks. These changes are reflected in the descriptions of key knowledge, skills, and strategies at each level (Section 2); descriptions of fluent and independent performance in a range of settings at each level (Section 3); and the examples of real-world activities that can be accomplished at each level (Section 4).

In its original version, the Learn Through Research standard was defined in three components of performance that are almost identical to the first three components of performance featured in this current version (the one difference is that the term “interpret” no longer appears in the third bullet of the current version). However, as we reviewed field development data and supporting research, we determined that it was important for a full definition of the integrated skill process represented by the EFF standard to include more explicit reference to communication of research findings. Therefore, we have added a fourth component of performance to the definition of the standard: “interpret and communicate findings”.

Section 2: Key Knowledge, Skills, and Strategies

Section 2 of the performance continuum for Learn Through Research contains descriptions of some of the key knowledge, skills, and strategies that form the basis for proficient performance on the standard at each level. This listing of key knowledge, skills, and strategies is specific to each level and is the foundation for designing assessments to measure performance at that level. Beyond serving as guide for assessment development, the key knowledge, skills, and strategies described at each performance level can also be used to identify instructional objectives or can be included in the criteria used for placement of learners in instructional levels.

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The first bullet under the definition of the standard *Learn Through Research* at each level addresses the ability to identify and pose a question or problem, or to make a prediction about objects or events, that will guide the subsequent research process. At all levels, the formulation of a “researchable” question depends on one’s demonstrated understanding of the purpose and context of research; such understanding can be recognized, at least in part, in accurate observation of, and ensuing curiosity about, situations from which research questions emerge. Development from level to level along the Performance Continuum is characterized by the increasing complexity and novelty of the research question being posed (and so, of the situation from which the question emerges). At level 1 the questions posed by the researcher are fairly simple and can be addressed by pursuing a few sources of information that are relatively familiar and accessible. However, as one develops expertise in the research process, one is increasingly able to formulate questions about increasingly problematic situations that are more complex and less like problems that one has articulated in the past. By level 3 on the Continuum, such complex questions require the researcher to come up with an extensive research plan that will incorporate a wide range of information sources and data-gathering strategies.

Along with increasing complexity of questions posed comes the necessity to use more, and more varied, lines of inquiry in order to collect adequate data. This connects the first to the second bullet of the standard definition at each level of the Continuum, as this second bullet concerns the sources of information tapped to address the research question and the number and sophistication of strategies available to gather information from those sources. At the novice level of performance, a researcher can draw on a few easily accessible sources of “known” information and use simple strategies to gather information from them. At level 1 on the Performance Continuum, use of multiple lines of inquiry might include recalling one’s own experience in the problem situation, listening to and asking a few questions about the experiences of others, and/or reading with understanding some simple text, and then documenting some information from each source. Development of ability to identify and use sources of information to address the research question is marked by access to an increasing number and variety of sources, used with an ever-widening range of strategies. At level 2 on the Continuum, the focus of data collection remains primarily on “known” information, but the sources that the researcher is able to access are more numerous (longer texts and oral presentations, graphic representations of data, resources on the world Wide Web) and the ways to access that information are more sophisticated (deeper questioning, interpretation of charts and graphs, use of technology). By level 3 the researcher can use a wide range of information resources and strategies to tap them, including designing some forms of investigation to unearth “new” information.

The cognitive processes involved in organizing, analyzing and evaluating the findings of inquiry are the focus of the third bullet of the definition of the standard at each level on the Performance Continuum. At every level, the research question is the guide as one evaluates the quality and relevance of the collected information, no matter how much or how complicated the data. And at every level, even in the most basic articulation of the inquiry process, the researcher is able to integrate new information with prior, “working” content knowledge related to the research question. Change and development along the continuum is evident in the number and sophistication of cognitive strategies available to the researcher for organizing and analyzing relevant information. At the novice level, Level 1 on the Performance Continuum, the researcher is able to collect and combine discrete bits of information to address the research question, but as

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expertise grows the researcher is increasingly able to process the information in more efficient and useful ways – especially important as the information itself is more abundant and complex. So at level 2 the researcher is able to paraphrase and summarize important information. And by level 3, cognitive processing of information takes the form of increasingly complex organization (classification, categorization, synthesis) and higher levels of abstraction (generalization, inference).

The fourth bullet of the definition of *Learn Through Research* appearing at each level on the Continuum addresses the metacognitive functions of monitoring, decision-making and adaptation based on feedback necessary to an effective inquiry process. Development along the continuum from novice toward expert is marked by increasing number and maturity of monitoring strategies, from such basic activities as use of trial-and-error, to some ability to summarize and evaluate findings at succeeding stages of research, to the more complex task of identifying and drawing inferences based on patterns emerging in findings. At every level, recognition of the importance of monitoring learning in these ways and the ability to adjust research methods as necessary to improve the research process are important indicators of proficiency.

In the final bullet of the standard definition at each level, the ability to interpret and report findings of the inquiry process is illustrated as a key component of performance. Communication and representation of ideas is the focus here, and developing expertise is characterized by the growing number and complexity of methods available to the researcher in reporting what has been learned, what might be concluded, and what new questions have been raised through the research. At level 1, reporting of findings takes simple forms such as oral restatement of, or pictures representing, combined information from a few sources. At level 2, a more sophisticated stage of data analysis is reflected in longer and more sophisticated forms of communication and representation of research results. And by level 3, complex ideas and inferences drawn from the research process require the researcher to choose among a range of reporting methods that include extensive writing, complex graphics, mathematical communication and other technology-supported representations.

Section 3: Fluency, Independence and Ability to Perform in a Range of Settings

Section 3 is the description of fluency, independence and ability to perform in a range of settings expected for proficient performance on the standard at each level. Like the description of key knowledge, skills and strategies in Section 2, the descriptions in Section 3 are specific to each level and are intended to serve as a basis for guiding assessment, learning and instruction that is appropriate to that level.

With regard to *Learn Through Research*, key features of this section are descriptions of the level of effort required to accomplish a research task (relative difficulty or ease with which one engages in the inquiry process) and the amount and kinds of external support needed to plan and implement the inquiry process. At the novice level, individual performance is noticeably effortful; the researcher depends on significant guidance, direction and prompting from others within highly structured activities to be able to identify a research question, select and use appropriate sources of information, and monitor outcomes. In the movement toward expertise, individual performance depends less and less on external direction or structure; the researcher engages in, and eventually can initiate the process, with increasing ease and comfort. In a group

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setting this developing expertise may also be enacted in the individual's willingness and ability to lead others through the research process.

Section 4: Examples of Applications of the Standard

Section 4 of the performance level descriptions provides a short list of examples of the purposeful applications of the standard (activities) that can be accomplished by an adult who is proficient at each level. This list of examples is illustrative and not exhaustive. Like Sections 2 and 3, the descriptions of activities in Section 4 are specific to each performance level. These examples of things that adults can accomplish in the real world at each level of performance on the continuum are useful to adult learners and to their teachers as ways of making concrete the purpose and need for attaining increasing proficiency in performance on the standard. By making it clear what can be accomplished at each level, the descriptions of activities in Section 3 also provide motivation for higher levels of learning. The listing of real-world accomplishments also provides guidance for selecting and designing the content for instructional materials and assessments.

Research tasks here are defined with reference to three related features:

- The relative complexity of the research question;
- The number and relative complexity of the lines of inquiry used to collect and analyze information; and
- The number and relative complexity of the mechanisms for interpreting and reporting results.

At level 1, learners are expected to learn through research in the context of tasks where the research question is very simple and very easily defined. Once the question is identified and posed in tasks at this level (for instance, "what topics do students want to cover in our Parent Education classes?"), learners are required to identify and gather information through few, but more than one, relatively familiar methods of inquiry (for instance, putting the question to several current class members and looking at a list of topics from last year's class). Interpreting and reporting the results of this research at this level will be a fairly simple matter of repeating information, whether orally or perhaps through pictures on a poster-board. In level 2 tasks the questions are still fairly simple and defined ("What kinds of employment and training options are being offered at our Community College Job Fair?"), but require learners to pursue a number of lines of inquiry (question recruiters, read brochures, watch a video, talk to other attendees, and take notes on findings from all these activities). Effective reporting of research results becomes more challenging as learners need to identify and organize key relevant information, perhaps summarizing it in a brief written report or oral presentation enhanced by some examples of text or graphically displayed materials that came from the Job Fair.

Finally, by level 3 the tasks are focused by complex and often novel research questions ("what organizational policies should we develop, and what programs should we offer, in our new community learning center?"). They require learners to pursue multiple, complex and sometimes innovative lines of inquiry (attend workshops and review videos on nonprofit organizational development and fundraising, read policy manuals and program offerings from other organizations, search the world wide web for organizational policies related to personnel and responsible use of technology, interview or hold focus groups with community residents, etc.) And they require complex mechanisms for interpreting and reporting results (perhaps a series of

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presentations, supported by extensive written materials that include charts and statistical information).

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Background to the EFF *Learn Through Research* Performance Continuum

The EFF standard *Learn Through Research*, one of the four interrelated and sometimes overlapping EFF standards that are categorized as “Lifelong Learning Skills”, highlights one domain of adult knowledge and skills that is critical for adults to be able to draw from in order to carry out their responsibilities in their roles as family members, workers, and citizens. Defined generally as the act of posing questions or making predictions and then gathering and analyzing the information necessary to propose answers to those questions or confirm those predictions, the ability to “do” research is broadly acknowledged as an important “learning to learn” skill across many domains of content knowledge and activity. Employers want their workers to be able to find and use the information they need to solve problems and make sound decisions on the job when that information is not immediately available. Citizens need to know how to access the information and resources they need in order to exercise their rights and responsibilities, in a community and a nation. And given the wide range of issues and concerns faced by a typical family, the ability to find and effectively use new information to meet a specific need is a significant strength.

Not surprisingly, though, learning through research is an especially critical concern of those directly engaged in pursuits related to the physical, social and behavioral sciences. And whether the domain is “pure” or “applied” science, it is increasingly understood by those who teach others to engage in research, or “scientific inquiry”, that they are guiding learners not only to acquire new information but also to develop curiosity about their world, to observe it critically, to think about it logically, to solve problems and make decisions in a variety of contexts, and to apply their learning to new questions. As early as 1909, John Dewey, in an address to the American Association for the Advancement of Science, counseled that science was a way of thinking and an attitude of mind; therefore teaching of science needed to address research processes and methods as well as a body of knowledge.

Truly, then, the ability to carry out research so defined is a key to lifelong learning, not only in science but in a range of human endeavors. Nevertheless, in the realm of K-12 instruction, leadership in articulating the importance of including learning through research in the curriculum has come primarily from the field of science education. The National Research Council publication in 1995 of the National Science Education Standards codified the role of direct instruction and practice of scientific inquiry methods. In an Introduction to the Standards (1997), the authors define “learning science” as learning to describe objects and events; to ask questions; to acquire knowledge; to construct explanations; to test explanations in various ways; and to communicate ideas to others. In further support of the important role of scientific inquiry in learning, the Science Education Standards include one – Teaching Standard B – which directly addresses mastery in teaching Science through inquiry.

While the ability to Learn Through Research has been acknowledged as a desirable focus of K-12 science education, its role in adult learning and development has been less clear. Explicit treatment of scientific inquiry principles and processes is rarely found in the traditional, academics-focused adult basic skills curriculum. An exception might be argued for the content instruction related to preparation for the high-school equivalency (GED) exam, especially in the subject areas of Science and History. In reality, though, the scope of research or investigation

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included in these classes has been quite limited given significant constraints of time, teacher expertise and available resources. So teaching and assessing ability to learn through research in adult basic/literacy/ESOL education, and doing so as necessary in complex, real-world adult contexts, across several domains of adult activity, is a fairly new endeavor. That has made our job -- to develop a Performance Continuum for the standard that will support valid and reliable assessment of individual performance on the standard -- a challenging one, and our understanding of competent adult performance in learning through research continues to evolve.

The empirical basis for the three performance level descriptions for the Learn Through Research Performance Continuum is data on adult learner performance collected by EFF field researchers who developed and piloted activities and performance tasks based on this EFF standard in their ABE, GED, and ESL classes. We are particularly grateful to the teachers and learners who “tread new ground” with this standard in order to provide rich descriptions of learner performance of the standard in their instructional contexts. Our current data does not support definitions of performance levels below or above the three levels we have described. In the future, research to support the description of higher performance levels or of “pre-Level 1” performance levels for more beginning level learners may be developed.

The EFF approach to defining performance levels for *Learn Through Research* depends on a conception of research as a domain-independent, integrated skills process that incorporates scientific research goals and methodology. Though domain-independent, this approach reflects the broad conception of “Scientific Inquiry” articulated in the National Science Education Standards (1995): “Scientific Inquiry refers to the diverse ways in which scientists study the natural world and propose explanations based on the evidence derived from their work.” Specifically this process calls for

- Ability to articulate a purpose for research and to pose a research question;
- Ability to identify sources of known information, to design and execute investigations/experiments as needed to unearth new information, and to gather data from them;
- ability to evaluate the relevance of gathered information to the research question, to organize, analyze and interpret relevant information, and to integrate it with prior knowledge;
- ability to monitor the effectiveness of this process in addressing the research question, and to flexibly adjust the approach if warranted;
- ability to communicate findings.

In addition to analysis of EFF field research data, we conducted a review of available research regarding scientific inquiry methodology. In the background resources we studied, we found broad agreement that the development of proficiency in planning and executing research is demonstrated through progressively more efficient, fluent, and independent performance in investigating increasingly complex and novel questions.

The following are some other key findings from our research review that have influenced the EFF definition of the standard *Learn Through Research*.

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The scientific research process

As noted earlier, the EFF approach to defining the standard *Learn Through Research* outlined above has been influenced by a general definition of the process of scientific research or inquiry that is widely accepted and practiced across physical, social and behavioral science and in its “pure” and “applied” forms. In the realm of physical sciences, E. Bright Wilson, Jr. (1990) elaborates the key components of the practice of scientific research:

- The choice and statement of a research problem (including the moral considerations attending the choice of a question to pursue);
- The search of the literature to identify known information;
- The design and execution of experiments utilizing scientific method to gain new information;
- The observation, classification and analysis of new data to test a hypothesis;
- The development of “scientific inferences” based on data analysis; and
- The report of results

Meanwhile, in his discussion of the “knowledge base” of theoretical (meant to develop, explore and test theories or ideas about the world) and empirical (based on observations and measurements of reality, that is, what we perceive of the world around us) social science research, William M. Trochim (2000) addresses a similar set of steps in the research process, steps that are reflected in their focus and sequence in the definition of the EFF standard *Learn Through Research*:

- Problem conceptualization and formulation (focusing on three cumulative types of questions – descriptive, relational and causal – with causal relationships being of greatest interest);
- Research design (experimental or quasi-experimental? what kind of sampling? What kinds of measures and methods?) and execution;
- Data analysis;
- Development of inferences based on estimations of probabilities derived from data analysis; and
- Writing up the results.

The contribution of cognitive science

The National Research Council authors of the National Science Education Standards clearly had such definitions of the scientific research process, as well as a cognitive science approach to how people learn and develop expertise, in mind when they discussed the process of inquiry in their Introduction to the standards. They state that learning science ought not be just “hand-on”, but “minds-on”. In other words, learning through research in the science classroom would be enhanced by employing modes of inquiry that allowed for interaction with others; for connecting prior knowledge to new learning; for applying content to new questions; and for problem-solving, planning, decision-making and group discussion. Students needed direct instruction in modes of inquiry, rules of evidence, ways to formulate questions, and ways to propose explanations. Further, students needed to know how to monitor their ways of knowing and learning by engaging in development of empirical criteria, in logical argument, and in skeptical review. And they needed opportunities to apply and practice what they learned.

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In this context, scientific inquiry is defined as the process of

- Making observations;
- Posing questions;
- Examining sources of information to see what is already known;
- Planning investigations;
- Reviewing prior knowledge in light of experimental evidence;
- Using tools to gather, analyze and interpret information;
- Proposing answers, explanations and predictions; and
- Communicating results.

In addition, the process requires identification of assumptions, use of logical, critical thinking, and consideration of alternative explanations.

In his guide for teaching and learning related to inquiry and the National Science Education Standards, Steve Olson (2000) further explores the NRC definition of scientific inquiry in the context of instructional practice as the basis of a description of the cognitive processes involved in learning through research. In his treatment, the “inquiring mind”

- Makes observations of the world, and exhibits curiosity about those observations;
- Defines questions from a knowledge background;
- Uses those questions to guide investigation;
- Gathers evidence, using all tools and resources available, including technology and mathematics;
- Uses previous research;
- Proposes possible explanations
- Collects more data to test those explanations;
- Reports explanations based on evidence; and
- Considers new evidence that emerges over time and adds to the previous explanations if appropriate.

Framed in these ways, deep understanding and proficient practice of “scientific inquiry” is at the very heart of the EFF conception of learning through research as an active/interactive, critically reflective, problem-solving-oriented, lifelong learning process.

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