SCIENCE LEARNING

ACTIVATION LAB

The ActApp: A Toolkit for Evaluating the Outcomes of STEM Learning Experiences

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Why the ActApp?

Researchers and practitioners need validated, easy-to-use research and evaluation instruments that have been tested and used in a range of formal and informal learning environments. The **ActApp Toolkit** provides these instruments and guide for their use.

- **Researchers and Evaluators:** integrate these tools into your work without having to design tailored instruments from scratch.
- **Practitioners:** implement an evaluation of your program using validated, field-tested instruments that are proven to be effective in your learning environment.

The Toolkit includes surveys and observation protocols intended for use on learner populations aged 10-15 in wide range of formal and informal learning environments. These instruments were developed by the Activation Lab Team, a collaboration among researchers at the University of California, Berkeley's Lawrence Hall of Science and at the University of Pittsburgh's Learning Research and Development Center.

What is *Activation*?

Learning Activation: the set of of dispositions, practices, and knowledge that enable success in proximal science, technology, engineering, art, and mathematics experiences. "Success" refers to learners' choice to participate in learning opportunities when presented, their positive engagement during a learning experience, perceived success during a learning activity, and learning from the experience. To date, literature reviews and empirical study has revealed five *dimensions* described below. Dimensions are measured in surveys and observation protocols available through the ActApp. They can be measured independently, or together to assess learners' overall Activation.

Fascination

Subject addressed: Science; STEM
Definition: interest and positive affect toward science, curiosity about the natural world, and goals of acquiring and mastering skills and ideas.
Aligns with: curiosity; interest in science in and out of school.
Sample item: "I want to know everything about science." Answer choices = YES!, yes, no, NO!

Values

Subject addressed: Science; STEM
Definition: the importance placed on being able to know or do science because of its utility in being able to meet personal goals, and its utility to society.
Aligns with: identity.
Sample item: "Science makes the world a better place to live." Answer choices = YES!, yes, no, NO!

Competency Beliefs

Subject addressed: Science; STEM
Definition: the learner's beliefs about their ability to successfully participate in diverse learning situations as well as their beliefs about having core skills.
Aligns with: self-efficacy.
Sample item: "If I did my own project at an after school science club, it would be:" Answer choices = excellent, good, ok, poor.

Innovation Stance

Subject addressed: STEM
Definition: enthusiasm for new STEM-related ideas, for trying new ways of doing things in STEM, and for sharing STEM ideas with others.
Sample item: "I like making new things, even if I am not very good at it." Answer choices = YES!, yes, no, NO!

Scientific Sensemaking

Subject addressed: Science
Definition: interacting with text and tasks using methods generally aligned with science, like: asking good questions, seeking explanations, engaging in argumentation, and interpreting data.
Aligns with: argumentation; investigations; mechanistic explanations; generating questions; evaluating evidence; nature of science
Sample item: Questions present a science scenario and ask youth to make sense of the data provided using principles of scientific sensemaking.

Other constructs measured via survey:

Engagement: administered immediately post-experience. Includes affective (intending to produce a result, i.e. persistence), behavioral (participation in experience), and cognitive (psychological thinking).
Perceived success: administered immediately post-experience. the degree to which participant felt they succeeded at a particular STEM learning experience.
Choice preference: extent to which learners wish to participate in a science-related activity.
Background: demographic characteristics and past experiences

Observation Protocols

Engagement: Records the affective, behavioral, and cognitive engagement of a focal participant in great detail.
Simplified Engagement: observer impressions of affective, behavioral, and cognitive engagement of a focal participant.
Group activity: whole-group activity during a learning experience/ session; characterizes activity components and features, and captures group dynamics.

Using the Toolkit

The ActApp Toolkit is designed to be used in a wide range of learning environments. Users are guided through a 4- step process to evaluate its effectiveness for their particular need.

Step 1: Decide if the Toolkit is right for you

- Do the constructs align with the targeted outcomes of the learning experience and learner population?
- What resources exist to administer the surveys and analyze the data?

Step 2: Explore our Tools

- Which survey instruments will you use, if any?
- Which observation protocols will you use, if any?

Step 3: Use the Toolkit

- Design data collection: What evaluation questions will you ask? What population will be measured by the tools? When and how will you administer the tools—paper and pencil or online?
- Design the plan for deploying the tools, compiling your data, scoring your data, and analyzing your data.

Step 4: Get the Tools

- Generate paper or online surveys using the *Survey Construction Tool.*
- Download observation protocols.

The Activation Lab team at the Lawrence Hall of Science can help with any stage of the process:

Option	Administration	Cleaning	Scoring	Analysis	Interpretation
Full-service	Hall / Program	Hall	Hall	Hall	Hall
Analysis Support	Program	Program	Hall	Hall	Hall
Minimal Support	Program	Program	Hall	Program	Program

Contact us at **info@activationlab.org** to discuss these options or to design a custom option.

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