




Why science teachers
should not be given
playground duty.

Research on



Informal Out-of-School STEM Education

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An Annotated Bibliography

Research on Informal STEM Learning

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Research on Informal STEM Learning (ISL) An Annotated Bibliography of Selected Sources

- **Definitions**
- **Selected Books**
- **Published Research Articles**
- **STEM Organizations and Reports**

What's Informal STEM Learning?

- ❖ Adjunct to the formal P-12 curriculum
- ❖ Learning vs. Education (acronym = ISL)
- ❖ Conducted Out of School
 - After School Programs
 - Summer Programs (or school vacations)
 - Field Trips or camps during school calendar
- ❖ Activity-based, hands-on inquiry, research, and problem-solving

ISL Research Foci

Outcomes:

- ❖ Achievement of K-12 STEM Standards
- ❖ STEM Activation – Stimulation of Interest in STEM
- ❖ Identification of Career Interest in STEM
- ❖ College acceptance into STEM majors
- ❖ Career progress in STEM

The Challenge:

- ❖ Attributing Impact to ISL

Learning Activation Lab

- ❖ Collaborative of STEM researchers at Universities
- ❖ Validated, reliable, easily-used ISL surveys
- ❖ Measures of Learning Activation:
 - ❖ *Fascination* – Interest and curiosity in STEM knowledge
 - ❖ *Values* – Belief in STEM to solve social problems
 - ❖ *Competency Beliefs* – Belief in one's ability to do STEM
 - ❖ *STEM Sense-making* – Ability to apply STEM-based thinking skills (e.g., asking questions, designing investigations, interpreting data, engaging in argumentation about explanations, etc.)

STEM vs. STEAM

- ❖ **STEAM** – Science, Technology, Engineering, Arts, and Mathematics
- ❖ Increased interest in STEAM
- ❖ Learning Activation Lab surveys incorporate STEAM learning

Opportunities for Project Research

NSF – Advancing Informal Science Learning (AISL)

❖ InformalScience.org

WestEd – Corporate Philanthropy

❖ STEMWorks.WestEd.com

A Variety of WV-based Programs

(WV Dept. of Ed., Benedum, Community Fdn., etc.)

❖ StemFinity.com

Many Others...

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National Youth Science Foundation Website

- ❖ NYSCenter Library –
<http://nyscenter.us/library/>