The Proof is in the Research

NCWIT K-12 Alliance Member Huddle
12:00pm PST/3:00pm EST
February 21, 2019
Welcome

Leslie Aaronson
Strategic Director of K12 Initiatives

Jannie Fernandez
Director, K-12 Alliance and TECHNOLOchicas

JeffriAnne Wilder, Ph.D.
Research Scientist
National Center for Women & Information Technology (NCWIT)

Monica M. McGill, Ed.D.
Associate Professor
Department of Computer Science,
Knox College

Emily McLeod
Director of Innovation, Research, and Curriculum, Techbridge Girls

ncwit.org
Goals

- Get Connected
- Quarterly Huddles around themes to stay informed
- Learn from each other
- Highlight the work that you are doing
- Share useful tools/opportunities to all members
Expectations

• Take the lead!
• Ask questions
• Promote your work!
• Make Connections with each other
• Missed our last Huddle? Catch up here
An Easy-to-use Resource for Finding K-12 Article Summaries, Evaluation Instruments, & Tips

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What if...

...you wanted to find articles related to studies based on your planned activities?

...you wanted to assess content knowledge among students participating in your new CS course or curriculum?

...you were in interested in dabbling in research?

Wouldn’t it be nice to go to one centralized site to find pre-made assessments?
We’ve started this!

csedresearch.org

• A framework for data curated from articles related to K-12 CS education

• Includes evaluation instruments related to computing, STEM, and general assessments related to educational psychology

• Includes tips and other resources for researching and reporting on K-12 CS ed activities and curriculum
Agenda

• Background (just a little bit for context!)

• Demo the site

• Wrap, answering any questions you may have
Resource created

csedresearch.org
Soft launch March 2018
Hard launch October 2018

@csedresearch - Launched December 2018
Target demographic

- Researchers investigating and inventing K-12 CS Ed
- Evaluators (ditto)
- K-12 curriculum designers
- K-12 teachers, pre-service teachers
- Those (like you!) who are on the forefront of bringing K-12 education to the masses.
Keep in mind

• This is an evolving site.

• Although it doesn’t specifically target the average K-12 teacher, we would love to have your suggestions on how to make it useful to more teachers.

• If you want something and it isn’t there, talk to us!
Articles

• Over 500 summary data from articles

• Manually curated from 10 venues, 2012-2018

• Data can be extracted and shared in spreadsheet, PDF, or other form
Results (75 articles found)

Focus Area:
- Area: Curriculum

Student Filters:
- Grades: 8th
- Grades: 7th
- Grades: 6th

Decomposition: A K-8 Computational Thinking Learning Trajectory

Starting from Scratch: Outcomes of Early Computer Science Learning Experiences and Implications for What Comes Next
David Weintrop, Alexandri K. Hansen, Danielle B. Harlow, Diana Franklin | ACM ICER (2018)

A Community Model of CSforALL: Analysis of Community Commitments for CS Education

A Collaborative Course for Learning How to Teach Summer Java Coding Camps

A Stepwise Case Analysis of Instructional Strategies to Support Participation of K-8 Students in Computing Education

Evaluation Instruments

• Over 100+ instruments collected (General, STEM, CS)
  • Largest concentration on CS (over 50 instruments)

• Manually curated information about instruments

• Linked to articles that use the instrument

• Users can submit their own evaluation instruments for inclusion
<table>
<thead>
<tr>
<th>Type</th>
<th>Demographic</th>
<th>Year Published</th>
<th>Assessed</th>
<th>Number of Questions</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>General</td>
<td>PreK-5&lt;sup&gt;th&lt;/sup&gt;</td>
<td>2010-2019</td>
<td>Validated Validated</td>
<td>1-15</td>
<td>Fee</td>
</tr>
<tr>
<td>STEM</td>
<td>6&lt;sup&gt;th&lt;/sup&gt;-8&lt;sup&gt;th&lt;/sup&gt;</td>
<td>2000-2009</td>
<td>Assessed Assessed</td>
<td>16-30</td>
<td>Pay to Access</td>
</tr>
<tr>
<td>Computing</td>
<td>9&lt;sup&gt;th&lt;/sup&gt;-12&lt;sup&gt;th&lt;/sup&gt;</td>
<td>1990-1999</td>
<td></td>
<td>Etc.</td>
<td></td>
</tr>
<tr>
<td>Undergrad</td>
<td>Grad/Pre-service</td>
<td>1980-1989</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PD</td>
<td>Instructor</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Parents</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

If (Type == “Computing”)

<table>
<thead>
<tr>
<th>Content Knowledge</th>
<th>Student Engagement</th>
<th>Learning Strategies</th>
<th>School Climate</th>
<th>Social-Familial Influences</th>
</tr>
</thead>
<tbody>
<tr>
<td>Computational Thinking</td>
<td>Behavior Cognition</td>
<td>Cognitive Behavior</td>
<td>Academic Emphasis</td>
<td>Parent/Family</td>
</tr>
<tr>
<td>Algorithm Analysis</td>
<td>Affect</td>
<td>Meta-cognitive</td>
<td>Teacher Variables</td>
<td>Peer Influences</td>
</tr>
<tr>
<td>Etc.</td>
<td></td>
<td>Behavioral</td>
<td>Leadership</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Other</td>
<td></td>
</tr>
</tbody>
</table>

Constructs are shown below these noncognitive categories
Evaluation Instruments (Beta)

Filters

- Type
  - Computing
  - STEM
  - General

- Demographic
  - PreK - 5th
  - 6th - 8th
  - 9th - 12th
  - Undergraduate
  - Graduates/Pre-Service
  - Professional Development
  - Instructors
  - Parents

Student Knowledge Content

Student Engagement

Learning Strategies

School Climate

Results (9 Instruments Found)

- **Type**: Computing
  - **Demographic**: 6th - 8th

  **Computational Thinking Test** | 2015
  URL | PDF | Ms Word | Qualtrics

  Developed to evaluate computational thinking skills among middle school students.

  **Computer Attitude Questionnaire (CAQ) version 5.14** | 1995
  URL | PDF | Ms Word | Qualtrics

  Constructs measured: School Climate (Academic Emphasis: Enjoyment-School)

  Designed to measure middle school students' attitudes, specifically importance of computers, enjoyment, motivation, study habits, empathy, creativity, and anxiety.

  **Draw-a-Computer-Scientist Test** | 2017
  URL

  Constructs measured: Student Engagement (Affect: Perceptions)

  This instrument/test is used to provide students with an opportunity to draw a computer scientist. The goal is to be able to gauge how students perceive computer scientists. It is adapted from the Draw-A-Scientist Test (DAST).

  **Microcomputer Beliefs Inventory for Middle School Students** | 1993
  URL

  Constructs measured: Student Engagement (Affect: Self-Efficacy; Cognition: Beliefs, Outcome Expectancy)

  Developed to measure middle school students' self-efficacy and outcome expectancy beliefs toward computers.
Research Tips

• How to write a research question for K-12 computer science education research

• Reporting Tips

• Checklists for writing/reviewing articles

• Design a Study (coming later this year)
Site Feedback/Enhancements

• As part of the K-12 CS Education community, what needs do you have?
• How could the site be improved/enhanced to make it more useful to you?
• Are you interested in submitting articles or evaluation instruments to grow the data set?
Come talk to us at RESPECT/SIGCSE

• RESPECT
  • Poster session, Wed, Feb 27

• A Topical Review of Evaluation Instruments in Computing Ed
  • Friday, March 1, 11:35am in Hyatt Greenway B/C

• NSF Showcase
  • Friday, March 1, 3-3:45pm

• A Gap Analysis of Noncognitive Constructs in Evaluation Instruments for Computing Ed
  • Friday, March 1, 2:10pm in Hyatt Greenway B/C
Thank you!

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Techbridge Girls
Essential Elements

- Our program: informal STEM for girls, PD for providers
- Received a NSF AISL grant to scale programs in 2012
- Scaled to Seattle and Washington, D.C.
- Evaluation + research on our impact, best practices
Youths have hands-on, minds-on opportunities to experience STEM/CS that reflect youths’ diverse communities.
Inclusive & Accessible Programs

Programs foster a sense of belonging and enable all youth to meaningfully participate and feel valued for who they are.
A youth development approach empowers youths by building leadership and strong social and emotional skills.
Role models, field trips to STEM companies, and hands-on STEM activities expose youths to a wide variety of careers.
Programs develop a network of support for youths’ STEM/CS interest that includes educators, families, STEM workplaces, role models and organizations.
Thank You!

Essential Elements

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THANK YOU
See you at Summit!