Growing the Quantity and Quality of Research Focusing on Broadening Participation in K-12 Computer Science Education using csedresearch.org

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This material is based upon work supported by the U.S. National Science Foundation under Grant Nos. 1625005, 1625335, 1757402, and 1745199

What if…

…we could at the push of a button find the best-fit K-12 CS education practices for teaching a given target demographic group based on empirically-based data?

Perhaps data that is crowdsourced--provided by researchers and practitioners across the nation?

A start to making it happen

- csedresearch.org – a framework for data curated from articles related to K-12 CS education as well as evaluation instruments related to computing

- Emphasis on “start”

Our story

- Began several years ago….
- Both were teaching in game curriculum programs
- Both were conducting research related to gender in games and game curriculum programs
- Realized that there wasn't much research at the time on the lack of women in the game industry
- Turned to the research in CS and realized that there was a lack of empirically-based research on outreach activities and broadening participation

NSF Proposal

- Based on systematic literature reviews, we empirically concluded that there was a dearth of quality research in this area at the time
- The two original primary objectives for this 5-year project are:
  - Identify, review, and analyze past and current pre-college computing activities and their impact on participants to determine the major influencing variables
  - Create and implement a formal process for collecting data related to pre-college computing activities, including major influencing variables, necessary for educational researchers to be able to evaluate and analyze the long-term impact of these activities

Phase I

- Identify and compile past and current pre-college computing activities across the nation. The information collected should include: nature and description of activity, duration of activity, number of participants, demographic information about participants, information about future college/career choices of participants.
- Create a publicly available archive of collected information about past and current pre-college computing activities, including information about impacts of participation. The data will be presented in a general format available for further analysis.
- Identify variables (independent and dependent) of past and current pre-college computing activities that are necessary for analyzing long-term impact of these activities, including specifics about the activity itself to provide individual context of the participants.

Phase II

- Synthesize the variables into a standardized, validated survey instrument
- Establish a process for collecting and analyzing:
  - Short-term participant data from pre-college computing activity coordinators and
  - Long-term participant data from participants through an automated, voluntary tracking system
  - Recollective participant data from college-age participants who have participated in pre-college computing activities
- Collect and analyze an initial set of data through the efforts of the research team along with a select group of pre-college computing activity coordinators
- Create and distribute resources, materials, and tools, including materials for IRB review, for collecting future data to be added to the archive

Resource created

csedresearch.org – Soft launch March 2018, hard launch October 2018

@csedresearch – Launched December 2018

Articles

- 500+ articles
- 10 targeted venues (ACM and IEEE journals and conference proceedings, CSE)
- 2012 – 2018 (2018 data added in December 2018)
- Data manually curated, undergoes two reviews
- Users can now submit their own articles

General	Evaluation Measures	Student Demographics	Instructor Demographics	Learning Activity Components	CSTA (In Progress)
• Article title • Author name and email • Abstract (and page number) • DOI/url • Venue • Publication year • Report type • Focus area • Basic study design • Research approach • Research question(s) or experience report description • Was gender analyzed in the article? • Was race/ethnicity analyzed in the article? • Was socio-economic status analyzed in the article? • General curriculum framework taught? (AP CS A, AP CS Principles, etc.) • Specific concepts taught	• What was measured • Measurement type (Field notes, surveys, enrollment,, etc.) • Measurement frequency (longitudinal, pre-intervention, post-intervention) • Related notes on measurement • Was effect size reported? • What values were reported (alpha, chi-squared, count, effect size, percentage, etc.) • Instrument used (if named)	• Total # students in study • Student age • Student grade • Student gender • Student race/ethnicity • Student disabilities (including if services are received) • Student SES • Prior experience of students • Location(s) of students (country, state, city/region, school, etc.) • Additional notes for student demographics	• Total # of instructors in study • Prior experience teaching computing • Instructor Race/Ethnicity • Instructor Gender • Who taught the activity/class (grad student, 11th grade teacher, etc) • Additional notes for instructor demographics	• Activity goals • Activity learning objectives • Curriculum used (home grown, established curriculum/program, etc.) • Average # of students in class • Tool/language used • Type of activity (camp, classroom activity, CS ed week, etc.) • When activity was offered (after school, summer, during school hours, etc) • Elective and/or required • Open or closed assignment(s) • All teaching methods (lab, lecture, on the job training, pair programming, etc.) • Assignment(s) overview • Activity duration (minutes, hours, etc.)	• Strand • Level • Category • Component

https://csedresearch.org/repository/

Home | Show Me | How Do I | About

Repository

Search the Repository

Hint: Separate phrases with commas (exploring computer science, high school, 2016)

Filters

Clear Filters

Focus Area

- [x] Activity
- [ ] Curriculum
- [ ] Learner
- [ ] Professional Development

Student

Age

Grades

- [x] Elementary
  - [x] Preschool
  - [x] Kindergarten
  - [x] 1st
  - [x] 2nd

Gender

Results (45 articles found)

Results per Page: 10

Focus Area:

Area: Activity ✖

Student Filters:

Grades: Preschool ✖ Grades: Kindergarten ✖ Grades: 1st ✖ Grades: 2nd ✖ Grades: 3rd ✖ Grades: 4th ✖ Grades: 5th ✖

[A Middle-School Module for Introducing Data-Mining, Big-Data, Ethics and Privacy Using RapidMiner and a Hollywood Theme]
Amber Dryer, Nicole Walia, Ankur Chattopadhyay | ACM SIGCSE (2018)

[Bricklayer: Elementary Students Learn Math through Programming and Art]
Michelle Friend, Michael Matthews, Victor Winter, Betty Love, Deanna Moisse, Ian Goodwin | ACM SIGCSE (2018)

[Culturally-Centric Outreach and Engagement for Underserved Groups in STEM]
Danielle Cummings, Loretta Cheeks, Rosario Robinson | ACM SIGCSE (2018)

[Demonstrating the Ability of Elementary School Students to Reason about Programs]
Ashish Aggarwal, David S. Touretzky | ACM SIGCSE (2018)

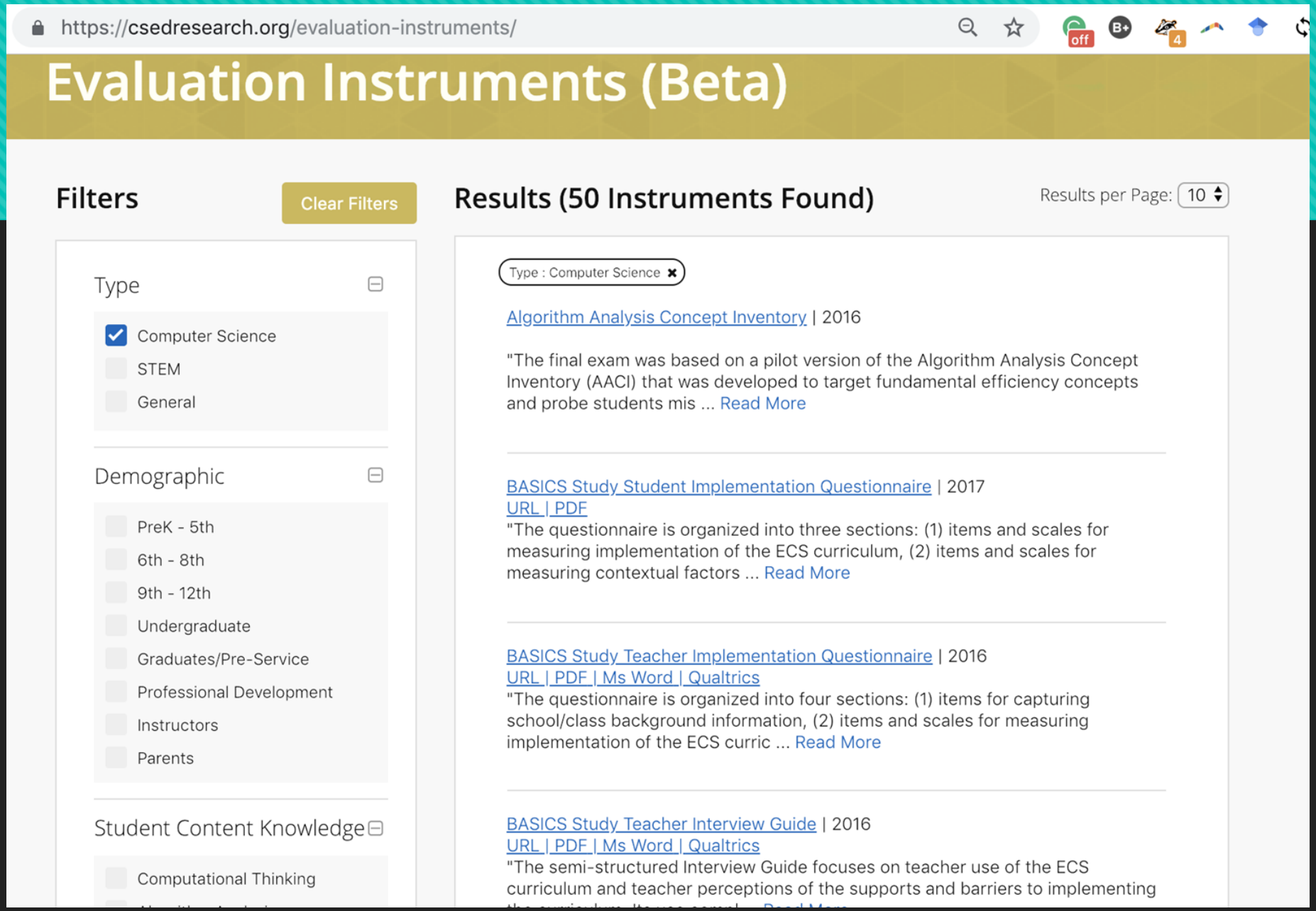
Evaluation Instruments

- 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

Type	Demographic	Year Published	Assessed	Number of Questions	Cost
• General • STEM • Computing	• PreK-5th • 6th-8th • 9th-12th • Undergrad • Grad/Pre-service • PD • Instructors • Parents	• 2010-2019 • 2000-2009 • 1990-1999 • 1980-1989	• Validated • Assessed	• 1-15 • 16-30 • Etc.	• Fee • Pay to Access

If (Type == "Computing")				
Content Knowledge	Student Engagement	Learning Strategies	School Climate	Social-Familial Influences
• Computational Thinking • Algorithm Analysis • Etc.	• Behavior • Cognition • Affect	• Cognitive • Meta-cognitive • Behavioral	• Academic Emphasis • Teacher Variables • Leadership • Other	• Parent/Family • Peer Influences
	Constructs Listed Below these Noncognitive Categories			


https://csedresearch.org/evaluation-instruments/
Evaluation Instruments (Beta)
Filters
Clear Filters
Type
Computer Science
STEM
General
Demographic
PreK - 5th
6th - 8th
9th - 12th
Undergraduate
Graduates/Pre-Service
Professional Development
Instructors
Parents
Student Content Knowledge
Computational Thinking
Results (50 Instruments Found)
Results per Page: 10
Type : Computer Science
Algorithm Analysis Concept Inventory | 2016
"The final exam was based on a pilot version of the Algorithm Analysis Concept Inventory (AACI) that was developed to target fundamental efficiency concepts and probe students mis ... Read More
BASICS Study Student Implementation Questionnaire | 2017
URL | PDF
"The questionnaire is organized into three sections: (1) items and scales for measuring implementation of the ECS curriculum, (2) items and scales for measuring contextual factors ... Read More
BASICS Study Teacher Implementation Questionnaire | 2016
URL | PDF | Ms Word | Qualtrics
"The questionnaire is organized into four sections: (1) items for capturing school/class background information, (2) items and scales for measuring implementation of the ECS curric ... Read More
BASICS Study Teacher Interview Guide | 2016
URL | PDF | Ms Word | Qualtrics
"The semi-structured Interview Guide focuses on teacher use of the ECS curriculum and teacher perceptions of the supports and barriers to implementing

Our data

- MySQL database
- Free and available for usage
- Requests for limited data are also being fulfilled (exported to spreadsheet)

Site Feedback/Enhancements

- Does this meet the current needs of the ECEP community?
- How could the site be improved/enhanced to make it more useful to you?
- Are you willing to submit articles or evaluation instruments to grow our set of data?

Contact information

csedresearch.org @csedresearch

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