Supporting Research on Inclusion in K-12 Computer Science Education using CSEdResearch.org

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***Abstract*—CSEdResearch.org was originally conceived in order to collect data necessary to discover empirically-based best practices for teaching K-12 computing across the demographic spectrum, with an eye towards improving the efficacy of outreach activities and curriculum for underrepresented groups. This resource includes evaluation instruments for computing education and a repository of articles related to K-12 computing education with the capability of filtering by demographic, such as gender, race/ethnicity, and disabilities. Instructors, researchers, and evaluators interested in inclusion and diversity in computer science education can use the CSEdResearch.org resources to quickly find relevant articles and evaluation instruments. The site is easy to engage in as a contributor and as an end-user. We encourage continued collaboration and feedback from users as this resource evolves.**

***Keywords*—K-12, research, evaluation, inclusion, diversity, resource**

I. Introduction

CSEdResearch.org was created for the purpose of investigating how underrepresented groups are faring in K-12 computing education and how early exposure affects their post-secondary course and major choices [1], [2], [3]. The primary features of the site assist in conducting this type of research.

The dataset foundational to this work currently has data curated from over 600 published articles (2012-2019), with more continually being added. The publication venues include ACM International Computing Education Research, ACM Innovation and Technology in Computer Science Education, ACM SIGCSE Technical Symposium on Computer Science Education, ACM Transactions on Computing Education, Frontiers in Education, IEEE Global Engineering Education Conference, IEEE Transactions on Education, Journal of Educational Computing Research, Koli Calling, and Taylor & Francis' Computer Science Education[1]. The data includes student and teacher demographics and searches can be conducted on this data (and more).

Using this resource can save users precious time when searching for research relevant to and for dissemination of their own research. This resource is continually expanding to include materials and search mechanisms for a variety of K-12 students, including learner groups of various abilities, genders, socio-economic status and races/ethnicities.

Within this extended abstract, we articulate the primary features of the site that enable this process, including a refined search system for related articles, a refined search system for evaluation instruments, how to access our data for your own studies, and how to contribute to the dataset.

II. Article Summaries

Users can perform searches of articles related to K-12 computing education using the convenient filtering on the demographics of the students or teachers that you would like to learn more about (see Figure 1). This is a quick way to save time finding articles, for example, related to girls learning computing in summer camps or boys learning programming using e-textiles.

The analysis being performed on the data has allowed us to consider longitudinal trends for various demographic groups [4]. For example, we learned that less than 5% of studies report data on disabilities of participants in research studies. We will continue to track this data over the next few years to call out trends and inform researchers how reporting in these areas can be improved.

III. Evaluation Instruments

Every program, be it a new integrated computing curriculum or an after school outreach activity, often requires an evaluation to determine how it impacted students, teachers, and/or others peripherally involved in the process. This could be funded or unfunded based on the needs of the program.

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[1]The Workshop in Primary and Secondary Computing Education is currently being added to the dataset

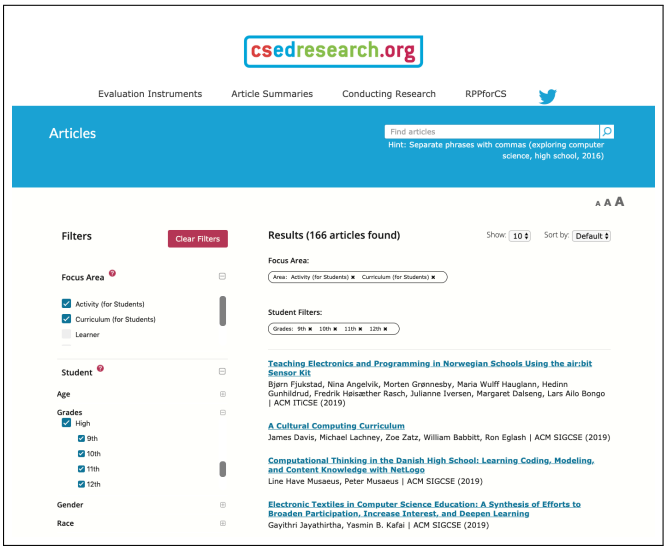

Fig. 1. Categorized article data make it easy to locate K-12 articles focused on specified demographic groups.

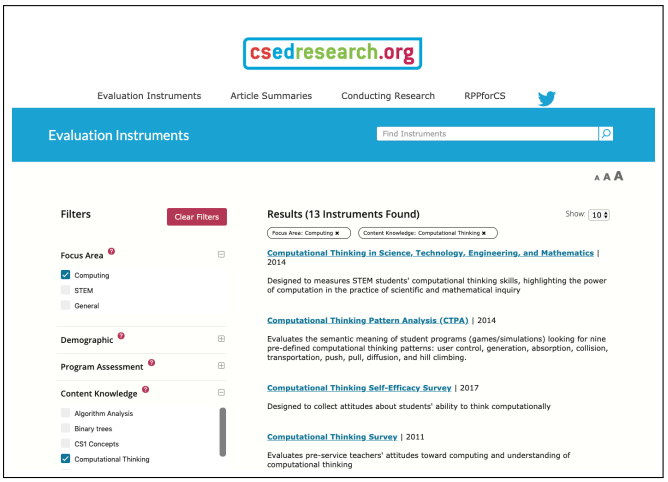

Fig. 2. Categorized evaluation instrument data make searches easy.

CSEdResearch.org's site provides the capability for users to quickly find useful evaluation instruments that have already been created and used. Some of these have existing evidence of reliability and validity. These instruments have been manually curated and tagged appropriately and users can find relevant instruments by selecting appropriate filter criteria (see Figure 2).

IV. Available Data

The data curated for CSEdResearch.org is available to the public. Although not in a centralized public repository at the moment, researchers who would like access to the data can contact our team. We can provide a fully copy of the dataset, or we can provide a subset of data in .csv delimited files.

V. Contributing to the Dataset

Though much of the data is curated manually based on the pre-specified journals, users can also submit their own articles and evaluation instruments for addition to the growing set of data.

We also provide a mechanism for giving feedback and ideas on improving the site for those performing research on diversity. By providing this important feedback, we can make the site even more meaningful for the CS education community studying underrepresented groups. As the site evolves and becomes more used within the community, the potential exists for improving the quality and the dissemination of research on diverse student learners.

VI. Conclusion and Future Work

The CSEdResearch.org dataset is a project dedicated to improving high quality research in K-12 computing education. We seek to drive this research forward so that the community can start to develop a better understanding of what works for various demographic groups based on empirical evidence. This data and the site is a free resource to the community that is continually be improved to better meet the needs of researchers in achieving this goal. Near future work includes:

- User login capabilities for providing feedback on evaluation instruments
- Capabilities for administering surveys directly from the site
- Capabilities for adding articles to the dataset to further increase article dissemination
- Dynamically generated heatmaps of the data embedded into the site
- Additional research guides
- Sharing the data through jyputer and/or github

We will continue to update the community on progress as the site continues to grow.

Acknowledgment

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