

“Getting Better at Getting Better”: A Connectivist Approach to Building a Community of CSEd Graduate Students

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Abstract—The future of computer science education will be determined, in large part, by the work of computer science education researchers, the pipeline for which is graduate students in computer science education. This poster describes an attempt to build a worldwide community of computer science education graduate students who are focused on the role and values of diversity, equity, and inclusion. The launch of this community incorporated virtual study groups, a virtual, participatory conference, and a post-conference survey. The experience is analyzed via the eight principles of connectivism in order to show how the development of a worldwide, networked, virtual community of CSEd graduate students can contribute to their learning, particularly of concepts and attitudes related to the role and values of diversity, equity, and inclusion.

Index Terms—computer science education, graduate students, diversity, values, equity, inclusion, community

I. INTRODUCTION

As computing becomes even more ubiquitous, what computer scientists and programmers do will determine not just the technical aspects of the future but the ethical and sociological ones as well. And what they are taught to do will be largely determined by the work of CSEd researchers. The lack of demographic balance for computer science students [1], instructors [2], and professionals [3] is an ongoing challenge, with the proliferation of algorithmic bias [4] as one negative outcome. Thus, building a community of CSEd graduate students (hereafter GS) grounded in a commitment to diversity, equity, and inclusion, has a potentially vast social impact. As a result of these challenges, a worldwide network of CSEd GS was formed to support the community.

II. COMMUNITY BUILDING

Siemens [5] conceptualized connectivism as a learning theory native to the digital age. Bali and Caines [6] articulated the case for faculty development based in connectivism and foregrounded in a concern for equity. The eight principles of

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connectivism will thus be the framework for understanding the development of the CSEd graduate student community.

The first principle of connectivism is that a diversity of opinions is the root of learning. Diversity was emphasized throughout the planning and execution of community building, and it was regarded by participants as one of the strongest aspects of the endeavor. One participant linked the interdisciplinary nature of CSEd itself to the community’s foregrounding of minoritized groups in CS, and the conference itself involved participants from twenty different countries. About one-third of participants resided outside of the United States, and the study group leaders and conference committee members resided in four different continents.

The second principle of connectivism is that learning involves connecting nodes of information. Linking CSEd GS with CSEd resources, mentors, content knowledge, and professionals was the key goal for this project, implemented via study groups, a conference, and the informal use of digital tools such as Twitter. As one participant mentioned in the survey, “I was able to connect with new people interested in equity within CS education” as a result of the experience.

That learning can inhabit non-human devices is the third principle of connectivism. An effective tool for community building was Padlet, a tool which allowed for real-time collaboration, wide participation, and the development of a repository of information. Padlets were used in several sessions of the virtual conference, drawing extensive audience participation. The Padlets devoted to the future of the community are of particular interest: in a Padlet discussing the core values of the community, several participants mentioned the importance of equity, accessibility, being globally-oriented, valuing those of a variety of backgrounds, and being “open to anyone.”

Connectivism’s fourth principle values the ability to know over current knowledge. The efforts at community building enacted this principle by providing opportunities for GS to augment their knowledge. For example, during the synchronous study group session on diversity, equity, and inclusion, small groups of participants discussed topics such as stereotype threat, intersectionality, and problematizing the term ‘equity.’

The process of creating space where GS have opportunities

to expand their knowledge is a key motivation for community building. Research on GS has shown that equity, diversity, and inclusion are not frequently discussed in most academic departments [7], with the result that students perceived that their whole social identity was not welcome in the department, leading them to conclude that they did not belong in their field of study.

Another signal principle of connectivism is that continuous learning requires creating connections. A summary of a small group discussion about diversity, equity, and inclusion highlights this principle in several ways:

And then we talked a lot about how we felt this fit with our research. So, I work with elementary students and . . . we try to get into all classrooms in a school so everybody has access to computing. Another person [said that] . . . when they recruit for their study . . . [they] try to get . . . everybody. . . . And we have to unlearn from our own biases And then another person [mentioned a study that] found that a lot of times the students drew men and they had beards [as their image of a scientist].

The various experiences of group members – in K5, with adult learners, in researching gender roles – are leveraged to compose a picture rich with detail about various aspects of under-representation as group members learn from each other. At the same time, each group member identified commonly with the need to unlearn biases.

Another principle of connectivism is locating connections between ideas. As one participant in the study groups articulated it, one of the foci of the community's work is to promote "just different ways of . . . reinventing how computing education is approached" by importing ideas from other disciplines. An example of identifying connections was provided to the community from one of the conference's keynote speakers, who explained how they combined their interest in hip hop music with their interest in programming:

So figuring out the interconnection between these two . . . disparate things; it wasn't just a research question, but it was really a path for me forward to figure out how am I going to connect the things that I know with computer science with myself? . . . The beautiful thing about hip hop and Black music is that it gives us the tools to talk about complex issues, problems for introductory and advanced programmers . . . songs actually have a structure that will have a nested loop. . . . So one of the things that I realized along my journey in grad school and along my journey as a researcher is that your story is your only weapon.

This identification of connections is an important aspect of boundary breaking, which is in itself a key aspect of promoting equity in the education of GS [8], where interdisciplinary programs are sites for boundary erasure.

The penultimate principle of connectivism is that learning activities should focus on updating knowledge. An example

of this was articulated by a study group leader: "the goal for today is just to create a space to learn from one another, to check in with one another, and to have good conversations." As one participant indicated in the post-conference survey, the various community-building exercises "established a 'home' for the grad student community."

Finally, connectivism acknowledges that decision making itself is a learning process. The CSEd graduate community has emphasized foregrounding equity, which is evident from a survey conducted before the study groups were launched (N = 52); when asked which topics were of most interest, personal values ranked close to the top [9] for students from computer science as well as those with an education background. Similarly, by having the planning and execution of the project managed largely by the GS themselves, their decision-making processes were leveraged to shape the community itself.

III. CONCLUSIONS

Connectivism permits the community-building experience to be framed in terms appropriate for the development of a virtual, worldwide learning community. While the virtual nature of the community was largely the result of historical necessity, it also leveraged technological and human resources so that the network is "capable of getting better at getting better" [10]. During this experience of community building for CSEd GS, evidence emerged of students "getting better at getting better" at conceptualizing issues related to equity in computer science education.

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