Integrating Social Good into CS Education

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1. SUMMARY

Computing for social good has become a common topic in computing circles, with professional organizations and conferences sponsoring discussions on the relevance of 'social good' material for computer science research [e.g., 1] and for education [e.g., 12,13,18].

This panel brings together instructors interested in and offering computing courses with exercises and projects on socially important themes, including environmental sustainability, protecting democratic processes, citizen science and science identity among young people, privacy and security, medicine and health, and disaster response. Computing courses with a primary focus on 'social good' applications for computing are also important and relevant.

The presentations cover material that integrates social good into CS education. Additionally, we will summarize past recommendations for infusing societal good applications by other authors into CS curricula [e.g., 7, 9, 10, 11, 12, 13, 18]. Audience participation is an important aspect of this special session, because we don't imagine that our coverage will be complete.

In addition to talking about subject matter ideas for assignments and courses, we address issues relating to "difficult conversations" [e.g., 8] regarding applications of social good in CS classes, because there are opportunities for disagreements between instructors, students, and parents (in the case of K-12).

Finally, one panelist (August) addresses funding possibilities, particularly from NSF, for the infusion of social good into CS curricula. Social Good engages a cross-cutting, interdisciplinary audience, has implications for broadening participation, and

prepares today's students for tomorrow's workforce, as we learn to develop and encourage practices that increase computing's bang for the buck relative to societal concerns.

2. IMPACT OF SOCIAL GOOD IN CS

Social good can be used to contextualize CS methods and concepts, which has positive implications for CS education.

- Students are often interested in making an impact, and that can be harnessed as a way to more deeply engage them. Many students are motivated by social relevance, and so inclusion of social good material can attract students, including underrepresented groups, into computer science [9, 13, 14].

- Social good contextualization increases opportunities for exercising communication skills and for considering the implications of computing, both of which are ABET-dictated outcomes for CS students:

  o "(h) An ability to communicate effectively with a range of audiences" [5]

  o "(g) An ability to analyze the local and global impact of computing on individuals, organizations, and society" [5]

- Our students will have opportunities to contribute to society, and we have a duty as instructors to prepare them for real-world scenarios.

3. AREAS AND TYPES OF INTEGRATION

The panel addresses several areas of 'social good' coverage explicitly, including environmental sustainability, protecting democratic processes, citizen science and science identity among young people, privacy and security, medicine and health, and disaster response, suggested both by panelist experience and prior proposals [e.g., 13].

Social good can be infused into formal CS curricula at multiple levels [10, 11], including fine-grained component-level integration of exercises, projects, and other assessments. For example, one panelist (Fisher) describes a database project that reverse-engineers the database necessary to support the Oberlin Dorm Energy monitoring project [17], which introduces students to issues of energy and environment, as well as exercising core competencies in database, and communication skills. Platforms for curating social good exercises in CS can include Wikibooks [11] and Nifty Assignments [15], as but two examples.

Course-level integration introduces whole courses that are focused on social good topics for computer science. These can be special topics courses and independent study courses. One panelist (Cameron) describes a theater production on data ethics as an

independent study for CS students, which integrated both accessibility and sustainability lessons into an HCI curriculum. Courses in computing and sustainability have been offered at a fair number of institutions [10], and CS courses with still broader treatments of social good have been offered as well [6].

In addition to infusion of social good applications into computing curricula, computing can be integrated into courses in other disciplines, such as integrating computational thinking into a social justice course (Cameron). This can also extend to informal learning activities, such as learning experiences and programs to support children's scientific inquiry engagement in everyday life contexts, to include topics at the nexus of computing and the social good [3, 4]. One panelist (Clegg) addresses how interactive computing is being used as a vehicle for informal education in the NatureNet project to promote conservation among college undergraduates [2]. One panelist (August) will describe projects recently funded by NSF that integrate social good into both formal and informal computer science education and suggest how convergence plays a role in these efforts and elsewhere.

4. CONCLUDING REMARKS

In sum, the special session spotlights specific opportunities for incorporation of social good topics into computing education, as well as the potential for incorporation of computing into education in other disciplines. The session discusses some of the difficulties of including social good material in a classroom setting when disagreements are present, and we explore potential funding opportunities as well.

5. ACKNOWLEDGEMENTS

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