Article

Can Citizenship Education Benefit Computing?

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Abstract: A recurring motif in recent scholarship in the computing ethics and society studies (CESS) subfield within computing have been the calls for a wider recognition of the social and political nature of computing work. These calls have highlighted the limitations of an ethics-only approach to covering social and political topics such as bias, fairness, equality, and justice within computing curricula. However, given the technically focused background of most computing educators, it is not necessarily clear how political topics should best be addressed in computing courses. This paper proposes that one helpful way to do so is via the well-established pedagogy of citizenship education, and as such it endeavors to introduce the discourse of citizenship education to an audience of computing educators. In particular, the change within citizenship education away from its early focus on personal responsibility and duty to its current twin focus on engendering civic participation in one's community along with catalyzing critical attitudes to the realities of today's social, political, and technical worlds, is especially relevant to computing educators in light of computing's new-found interest in the political education of its students. Related work in digital literacy education is also discussed.

Keywords: citizenship education; computer ethics; digital literacy; online activism

1. Introduction

This paper's answer to the question posed in its title grows out of three connected premises or convictions. First, recent work within the computing ethics and society studies (CESS) subfield argues that teaching formal ethics and codes of conduct has done little to prevent "many well-intentioned applications of algorithms in social contexts . . . [from causing] significant harm" [1]. Second, as a consequence we should focus less on ethics and personal responsibility and more on the wider social consequences of computing. Lessig [2] in the late 1990s argued that technological architectures were joining laws, markets, and social norms as the principal mechanisms shaping social behavior. Fields such as education, communications, political science, sociology, and psychology have keenly explored the many ways computing is interacting with their domains since Lessig wrote those words. Yet, the various computing disciplines themselves were curiously under-interested in such topics, preferring instead to focus on technical skills and objective engineering metrics such as efficiency and performance. The third and final premise is that while the recent "normative turn in computing" [3] has added values such as bias, fairness, equality, and justice to the roster of evaluative metrics of computing systems, these values cannot be evaluated without addressing the wider social context. As such, the field of computing itself is irredeemably political—a point that Lessig noted in 1999 and is now being recognized more and more within CESS [4–10].

While it is relatively easy to acknowledge the political nature of computing, it is quite another to know how to operationalize this belief in the classroom. The rest of this paper proposes that one helpful way to do so is via the concept of citizenship. Since the late 1990s, civics or citizenship education has been an important area of educational research as well as practical educational policies [11–15]. This effort tended to mirror wider concerns about ostensive declines in civic and political participation of young people [16]. In recent

years, interest in citizenship education has been renewed as researchers and policy makers struggle with ways to address the "deepening epistemological crises of democracy" that have been magnified by the spread of computing infrastructures [17]. As a consequence, a wide range of scholars have been examining the oft-overlapping areas of civic engagement and participation studies, democratic theory, digital literacy, and citizenship education. It is this paper's contention that within computing education we can learn from, and contribute to, this research.

The intent of this paper is thus to introduce the discourse of citizenship education to an audience of (principally university) computing educators. The rationale for doing so, is that this literature can provide a helpful set of languages and theories for understanding and conceptualizing the often-political relationship between computing and society, one that has already been integrated into the research and practice of scholars in education. If one is willing to accept the premise that computing is innately political, then it makes sense to expand the repertoire of political discourses available to computing. As such, this paper's first section will begin by describing changing efforts at covering citizenship topics within K-16 education. These educational efforts have moved from a very individualistic, personal responsibility focused approach akin to what we are often doing in computer ethics, to one that instead tries to kindle young people's participatory experiences and their willingness to engage in critiques of both their society and its technological ecosystems. The second section will briefly examine recent efforts at improving the digital literacy of students, which not only has some affinities to our efforts in computing, but which has found itself embracing the theoretic frameworks and practical goals of citizenship education. The paper's final section will offer some suggestions for connecting the discourse of citizenship into computing education.

2. Citizenship Education for Democracy

John Dewy's early 20th century book *Democracy and Education* [18] is often credited with popularizing the idea that one of the purposes of education is to create democratic citizens [19–21]. Since Dewey's work, a wide-range of different conceptualizations of the nature of democratic citizenship education have been proposed [22]. So what then is citizenship? As a concept in political thinking, it has a long history, dating back to Plato and Aristotle, and given its modern form by the republican thinkers of the eighteenth century [23]. Within 20th century political science, citizenship has generally been understood as a shared set of expectations about how members of a society engage in the political realm (e.g., [24,25]). While the meaning of citizenship can vary between nations with different political institutions [26], within democratic countries there is nonetheless significant overlap in expectations around citizenship [27], namely political participation, knowledge about government, commitment to order, and respect for the rights of others [28].

Interest in citizenship education was rekindled in the late 1990s and throughout the first years of the 2000s due to high-profile worries that political participation rates (voting, working for political campaigns, attending political events) were declining precipitously, especially amongst young people [16,29,30]. Within political science itself, these declines were eventually theorized not as a decline in political participation per se, but instead as a change in the form of participation. Young people, it was argued [28,31–33], were still participating politically at the same rate, but doing so via activities such as signing petitions, boycotting goods, and interacting politically online. Despite this work, declining political participation rates motivated the introduction of citizenship initiatives in education systems in many western democracies [11,12,15,34,35]. The broad adoption of citizenship education demonstrated a conviction amongst education policy makers that the health and stability of the democratic project depends to a large extent on the civic engagement and participation of its citizens (e.g., [36]). This "new moral pedagogy" [37] was operationalized within education systems in a number of different ways. The principal approach has usually been the citizenship-as-competence model [38], that is, a focus on teaching the principals of rights and laws, how they are implemented within one's particular democratic political

system, and one's roles and responsibilities within that system. This idea of citizenship-as-competence is individualistic in that it focuses on the duties and responsibilities of individual citizens, analogous perhaps to the individualistic focus on ethics and codes of conduct within CESS over the same time period.

Westheimer and Kahne [20] labelled this ideal the "personally responsible" citizen and argued that this conception is too narrow and often too ideologically conservative, in that the underlying approach to solving social problems is for individuals to discharge their citizenship duties (e.g., to vote). Similarly, Biesta [35,39,40], in a series of influential articles on the purpose of education, critiqued many of these citizenship education initiatives on the basis that they only address two of the three purposes of education. The three domains of purpose in education, according to Biesta are: qualification, socialization, and subjectification. Qualification is akin to teaching computing's technical capabilities: it is the knowledge, skills, and understanding needed to functionally do specific things (e.g., knowing how to register and vote in an election, write a grammatical cover letter, debug a program, or do a mathematical proof). Socialization is about developing dispositions; it is how we become successful members of particular social, cultural, technological, or political orders. This requires learning how to belong, generally by participating in those orders. Subjectification is, in some ways, the opposite purpose. It is learning how to achieve independence from those orders; it involves critique and an active willingness to work towards change. As argued by Biesta [35], "any education worthy of its name should always contribute to processes of subjectification that allow those being educated to become more autonomous and independent in their thinking and acting." Citizenship education, as it was commonly taught, was thus not living up to this subjectification purpose [39], see also [37,38].

Westheimer and Kahne's [20] other two conceptions of citizenship provided a template for achieving Biesta's subjectification purpose. They argued that there are two other ways of conceptualizing citizenship besides that of personal responsibility: namely, participatory citizenship and justice-oriented citizenship. A participatory citizenship education is one that is focused on getting students engaged in their societies and participating in community activities. This aligns well with claims being made within political science (referred to above) about changing patterns of participation amongst young people, especially in online environments. Young people, it is often argued (e.g., [32,33,41,42]), are more likely to employ the affordances of digital environments as a means of participating in their society. Justice-oriented citizenship by contrast, is less about involvement and more about understanding and critiquing the social, economic, technological, and political forces that order society. Franch [37] divides this type of citizenship into two smaller categories—social justice activism and critical counter practice—and argues that citizenship education moving forward needs to emphasize these aspects of citizenship.

So what effect has citizenship education—whether it be focused on personal responsibility, civic participation, or social critique—had on the citizenship experiences of students? There have been several summary reviews of the now quite vast literature on this topic. Manning and Edward found that these educational initiatives had little effect on the propensity to vote, but did increase the likelihood that young people would engage in other forms of political expression [13]. Campbell concluded that "well-designed civic education . . . has meaningful, long-lasting effects on the civic engagement of young people" [15], a conclusion echoed by Lin [14]. However, not all civic education interventions are well designed. Fitzgerald et al. [34] review of 648 US-based civic education research studies found that the personal responsibility model of citizenship still significantly predominated. This is worrisome as "there are some indications that curriculum and education policies designed to foster personal responsibility undermine efforts to prepare both participatory and justice-oriented citizens" [20].

A recent study by Bowyer and Kahne [43] of civic learning opportunities in Chicago indicates that this may indeed be the case, though the relationship between participation, critique, and civic education is complex and media dependent. They found that students

who actively create digital media that is tied to social and political issues were subsequently more likely to engage in online (but not offline) participatory politics. Students whose civic education intervention focused instead on credibility and critique (akin to the justice-orientation model of citizenship and its subjectification purpose) became less likely to be engaged in online participatory politics, but, vitally, became more likely to be engaged in offline participatory politics.

These findings have particular relevance to us within computing. The dominant model for teaching social issues within computing has been to teach normative ethical theories and codes of conduct [44–47]. This is very much akin to the citizenship education model of personal responsibility. If teaching duty and responsibility does undermine efforts to get students more civically and critically engaged with their communities [20,43], then perhaps our discipline's focus on teaching personal responsibility via ethics instruction also makes it less likely that computing students will be civically and critically engaged. If indeed we want computing students to be more socially and politically engaged in initiatives such as Computing for the Social Good [48,49], then perhaps we need to refocus our efforts in our CESS courses (and in our computing curricular recommendations) away from its preoccupation on ethical theories and codes of conduct and instead focus on inculcating participation, generating social critiques, and encouraging activism for social change. This has been the path followed in recent years by digital literacy studies within both communications and education disciplines, and which is the focus of the next section.

3. Finding Citizenship in Digital Literacy

The previous section described the building interest in the citizenship functions of education in the 2000s, an interest that was motivated in large part by changing patterns of civic engagement and participation. These changes were largely felt to be a consequence of the spreading ubiquity of online social environments [33]. At this same time, many educators also became interested in the parallel problem of "digital literacy". As described in the previous section, political knowledge is one of the traditional expectations of citizenship [28]. As such, scholars working within the citizenship area have often been engaged with research in communications around the topic of "media literacy", which had long focused on critically reading media messages, identifying underlying cultural codes, performing source checking, examining financial bias, and situating the messages within broader social and political contexts [50]. In the 2000s, media literacy morphed into digital literacy, reflecting the changing media landscape of those years. Digital literacy thus became an "epistemological frame to theorize and enact (both in policy and everyday social interactions) how individuals learn to live in digitally mediated social worlds" [51].

For most of the first decade of the 2000s, the focus in digital literacy education was very much on how to productively use digital tools (e.g., [52,53]). As sourly noted by Carmi et al., such digital skill programs "were aimed at keeping citizens passive and not proactive" [54]. This type of education thus played an ideological role, perhaps unwittingly, in that it characterized students as consumers (and products) of online environments [55]. The social consequences of such approaches became clear by the end of the 2010s. Digitally enabled malfeasances such as misinformation campaigns, algorithmically induced echo chamber distortions, self-selective exposure polarization, and the normalization of spectacle culture were now problems that even politicians (and academics) could see. In such a problematically politicized digital media landscape, the field of digital literacy could no longer content itself with simply teaching students to productively use tools. If the tools themselves had become political, then so too must literacy education [56,57].

Just as in the field of citizenship education, digital literacy scholars began advocating for a move away from just teaching technical competencies, and encouraged an active engagement in politics within literacy education. This changed perspective is summarized by Pangrazio [58]: "Learning within a techno-social system involves technical mastery and inquiry, analysis, and critique". One prominent example of this change was the UNESCO Media and Information Literacy Policy and Strategy Guideline, which explicitly linked

digital literacy education with the furtherance of democratization, justice, and equality goals [59]. This new "critical digital literacy" is also partly a pedagogy of resistance against digital ecosystems [54,59,60]. As noted by Crary, "for two decades, young people have been deflected from political agency and have become the vector onto which demands for technical conformity and consumption have been most unsparing" [61]. Within computing we too have contributed to these demands, advocating for more and more programming content in K-16 education without also advocating for any corresponding critical reflection around algorithms or data practices [62]. The next section will briefly discuss how citizenship education may help us in computing navigate this a critical and participatory transformation similar in spirit to that already taken by digital literacy education.

4. Connecting Citizenship and Computing Education

The world we face today within computing is much more fraught than it was two decades ago. Back then, one commonly encountered blithe narratives of community building (or even political revolution) through social networks, continuous innovation via digital disruption, and a world made steadily better through algorithms. While such beliefs kept our consciences untroubled, we are truly better off with the widespread repudiation of such myths. A loss of innocence can be disorienting, but is necessary step for gaining a more realistic attitude towards our field. In this new cognitive world, simply covering ethical algorithms for trolley problems [63] is no longer a sufficient strategy for engaging our students in the social and human consequences of computerization.

Couldry [64] wondered if computing as a discipline has the right intellectual toolbox for understanding and critiquing the problematic features of 21st century computing. The goal of this paper has been to suggest the discourse community of citizenship education (and the related one of digital literacy education) can help provide that toolbox. These communities, as we have seen, share some of the same concerns as those within the CESS community. Moreover, the educational intervention taken by some citizenship scholars can provide guidance on how to enact a possible transformation of our CESS teaching practice. Within digital literacy studies, there has been belated recognition that a narrow focus on technical competence has not done justice to the social needs of its students. We need this same recognition within computing education. Like those working within citizenship education and digital literacy education, our work in CESS should now be guided towards embracing a set of values that enable democratic participation and encourage the critique of the social and technological systems that structure our lives. Like theirs, our field needs to be pushed to articulate a coherent response to the question "what values should guide how citizens communicate and make shared decisions in civic life against a backdrop of systemic inequity and the powerful forces of division that digital media magnifies?" [65].

Throughout the 2010s, many computing educators embraced the goals of Computing for the Social Good movement [48,49]. At its best the movement encouraged students to move their concern beyond the acquisition of technical capabilities and see themselves as members of a wider social community containing injustice and inequality. At its worst, often in the guise of service learning projects, it presumed that the mere provision of computing to be innately a social good regardless of eventual outcomes [66]. Instead, we should take inspiration from computing education researchers who have explicitly embraced engagement/participation and justice-oriented education approaches. These include Lee & Soep [67], Tissenbaum et al. [68], and Yu et al. [69] who have explicitly been influenced by recent approaches in citizenship and digital literacy education. They advocate for a "critical computational literacy", one which engages students critically in social issues through computational projects. They illustrate how computing education can integrate the educational pedagogy of citizenship education and digital literacy education. If we truly want an authentic computing for the social good, then explicitly connecting computing education to social and political goals may be the best route to that end.

Computing researchers working within various equity pedagogies such as culturally relevant teaching [70] or culturally responsible computing [71] are also arriving at a similar

destination, albeit via a different route, one which endeavors to situate technological ideas within their sociopolitical context. A vocal but small contingent of computing researchers have been working in a similar vein, arguing that "current debates in computer science are political and not just ethical ones. They involve questions of not just 'what values does this technology assume?', but also 'what kind of society does this technology create?'" [7]. "Instead of a narrow vision of ethics grounded in vague principles and professional codes of conduct . . . the field must embrace politics" [9]. In their introduction to the Special Issue on justice-oriented computing [8], the editors argue that helping students with uncovering and critiquing the different ways that power and bias are encoded within algorithms and technological devices must be a key part of any computing education. Winner's influential 1980 essay "Do Artifacts Have Politics?" [72] is often the starting point for this line of thinking. Winner argued that technological systems can become political when they prevent certain social outcomes within a community (such as Robert Moses designing the height of New York freeway underpasses in the 1950s to prevent buses carrying lower income racial minorities from accessing public beaches) or when they privilege specific social outcomes (Winner's example here was how the mechanical tomato harvester encouraged the transformation of the tomato business away from small family farms to one dominated by large agribusinesses).

Winner's paper was especially valuable in that it allowed its readers to see the politics that can be hidden within even mundane technologies such as bridges and agricultural harvesters. Recent work within computing continues this tradition of uncovering the hidden politics of technological systems [7,73,74]. New ways of discovering and engaging with the social world of computing systems has broadened these approaches. For instance, the idea of intersectionality has been ported from feminist thought and applied to both education and to the evaluation of computing systems. Intersectionality "is a framework that seeks to account for the multiple, overlapping, and intersecting elements of people's identities and the ways system oppression shifts and changes in interaction with these intersecting identities" [21,71,75]. The benefit of an intersectional approach is how it foregrounds the stories and lived experiences of individuals from groups who might have been considered inconsequential to the main thrust of computing history. Hicks's [76] work uncovering the vital role of female programmers in the rise of British computing in the 1950s (and their displacement and eviction leading to its decline in the 1960s) is a superb example of the benefits of this approach.

Green and Vijoen [1] fascinating account about changes in legal education is especially relevant here. For the first half of the 20th century, the study of law was characterized by legal formalism, which focused strictly on the technical questions of how laws are made, amended, and interpreted. However, by the 1960s, the focus in legal education began to switch to legal realism, which asked students to focus not just on how laws are made and litigated, but also on the downstream impact of laws. As such, legal pedagogy "deeply absorbed the basic idea that the validity of laws should be measured in part in terms of their social and economic effects" [1]. This transition from strictly teaching the technical aspects of the law to teaching its social and political aspects as well transformed the very nature of the law itself. By emphasizing the social and political nature of the students' field of study, it required legal students to engage with broader intellectual currents within political science, sociology, psychology, and economics. This full transformation is still awaiting us in computing, but, as indicated above, it may be beginning. Recent work in citizenship education provides us with both the pedagogical justification and practical ways to implement this transformation in our classrooms. As indicated above, there are already a variety of computing educators who have been providing examples and approaches for thinking about computing education in a way that allows students to critique and/or address social issues. Recent work in citizenship education can supplement and expand this work. Of especial value is its focus on encouraging critical perspectives (on society and its digital ecosystems) and civic participation via activism (online and offline). Within computing education we have been more than willing to make use of theories of learning

from the wider discipline of education. Now that more and more researchers within computing education have been calling for a more politically oriented pedagogy, more than 25 years of citizenship education research provides a truly voluminous resource—one which also includes a growing library of randomized controlled trials [77]—for both inspiration and practical pedagogical approaches for accomplishing these aims.

5. Conclusions

"the real catastrophe is the perpetuation of the way things are and have been"

—Crary [61]

Crary's call for reform in regard to how we, as a culture, have uncritically valorized digital technology, is one which computing has been unsurprisingly slow to embrace. While industry and government efforts at broadening participation in computing have been widely applauded within computing, such efforts have come at a political and social cost [78], one which is being increasingly addressed by computing education and CESS researchers. However, as noted by Heath, "educational technology research grounded itself in theories of learning, but not in theories of citizenship" or political action [79], and as such, we in computing do not always have the intellectual resources for addressing the political and social consequences of computing. This paper has argued that we can address this lacuna by supplementing our work in computing education with the rich scholarship of citizenship education. It provides us with a pedagogy based on robustly researched and evaluated educational interventions whose focus is to catalyze both democratic civic engagement and a willingness to critique the technological systems of their discipline. It also provides some practical ways for introducing political topics into our curriculum, a not unimportant rationale given our field's relative unfamiliarity with such topics. Indeed, teaching potentially controversial political topics is often not easy. Nonetheless, we need to remind ourselves that this "is how we create and sustain societal trust: not by cherishing the illusion of an ideal world where power plays no role, but by creating and sustaining countervailing powers" [80]. Such educational change is never easy, but, as noted in the epigram to this conclusion, changing our curricular approach has become an imperative need due to the unparalleled, and often deleterious, consequences of 21st century computing.

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