Educational Priorities for Technology Mediated Social Participation

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Introduction

As civic, economic and recreational activities become increasingly mediated by technologies, *everyone will need to learn to be an effective participant in participatory processes, many will need to learn to lead them, and some will need to learn to design the platforms on which they run.* Taking advantage of civic, economic, and recreational opportunities and avoiding potential threats will depend on their facility with Technology Mediated Social Participation (TMSP). TMSP education, then, is a fundamental requirement for a prosperous and free democratic society.

What are TMSP skills? When and how should people learn them? In this article, we present recommendations for an ambitious program of education at multiple levels. In order to organize the pedagogy of TMSP education, we divide learners into multiple categories. What do all adults in the United States need to know about TMSP? What should we teach in this area in the K-12 system? What should all students in colleges and universities learn about this? What should specialists in TMSP to be able to do? We see two broad opportunities for education in this area. TMSP is dependent on complex interactions between social and technical systems, requiring expertise in the intersection that exists in those systems to truly take advantage of the opportunities we see here. Previous work has laid out the potential benefits of this socio-technical perspective [1], and in this work we lay out the agenda for training people to consider the complex interplay between these systems.

For those primarily interested in social participation, this agenda might enable new ways for them to facilitate their work. For those who study technology, computer scientists and engineers, opportunities in this area can ground their work in a meaningful and important application area. This article lays out a broad plan to introduce multiple topics across a heterogeneous set of learners who will be affected by and will affect TMSP.

To set the stage for the types of uses and needs for TMSP with multiple stakeholders, we describe several short vignettes of TMSP use in the public, and then provide an inventory of skills and topics that we see as essential to have effective TMSP literacy.

The community organizer. Scott runs a small non-profit in his mid-sized town, trying to get people to live more active lifestyles. He is the only full-time employee of the non-profit, and is in charge of budgets, events, managing volunteers, publishing materials and so much more that he feels it's impossible to spend a lot of time on social media. He suspects using online tools might help his mission, but doesn't know where to begin, or

how he would find time to do the upkeep. What sites and tools are effective and which ones are just a waste of time? Can he use his volunteers for this?

The public sector employee. Mary Beth is a senior member of the IT staff in her county government. She works with other IT staff to manage the needs of the 800 county employees, as well as to help create the web presence for the county, which is a major point of interaction with its residents. As an example of her activity, Mary Beth is being asked by the social workers, nurses and police of her county to create a wiki to share information about government and non-profit agencies who work with disadvantaged residents. To organize this work, she has to compare wiki platforms, including three for-profit companies that have bid for the job, and her internal human resources in its ability to maintain the software. She has to negotiate HIPAA and other policy/legal frameworks to determine how to deal with client data. She also has to work on adapting county content for an online environment (linking to appropriate resources, determining usable file formats) and develop some training materials for the people who will be working directly with clients.

The senior citizen. Ida Kowel, 78, is a recently widowed retiree living in Phoenix. She and Stanley relocated there from Boston three years ago, weary of the New England winters. Ida is adjusting to challenges of living alone after over fifty years of marriage. She is "fit as a fiddle," with few of the physical ailments that limit her neighbors in their planned independent living facility. She would like to stay in touch with her children and old friends from Boston, now scattered across the country, and to make new friends in her Sun City community. In Boston, she was an active volunteer, working for a local food bank and community garden. She'd like to learn more about opportunities to volunteer in her new area, but is leary of some of the dangers of the Internet. How can she expand her online experience meaningfully and safely?

These examples illustrate that TMSP is and will continue to grow to be the concern of multiple stakeholders, all of whom can benefit from better understanding the intersection of technical systems and social participation. Next, we'll discuss the current opportunities in TMSP education, and point to new programs that might help the people in the scenarios above.

Current Educational opportunities

There are many existing educational programs that are at least partially consistent with our broad vision. Most focus on digital or media literacy, the ability to find, assess, and use digital resources, while avoiding personal dangers. This is an important building block for TMSP. A few programs also go to the next level, teaching people how to effectively participate in and organize mutual aid, governance, and public goods creation projects.

At the K-12 school level, parent-groups, foundations, corporations, individual school districts and states offer media literacy programs and recommendations for students. They provide teachers with tools for addressing the challenges posed by various online

sources like Wikipedia, and help teachers to design curricula that provide students with learning opportunities and skills needed to critically engage in online participation.

Examples of such efforts include the MacArthur Foundation's extensive efforts to understand and reimagine education and learning in a digital world[1]. Projects such as the Media Literacy Project[2], the Consortium for Media Literacy[3], the Good Play Project[4], and the Digital Youth Network[5] provide information, curricula and action guides that aim to cultivate critical thinking and activism and empower students as responsible media consumers and creators.

In higher education, broad curricular standards tend to focus on information literacy skills such as finding, assessing and using credible information. Other TMSP-related course offerings have emerged based on individual interest of faculty and administrators in a variety of disciplines such as business[6], law[7], sociology[8], information studies[9], computer science[10], communication[11] and media studies[12].

Libraries, community colleges and distance education institutions offer courses and resources that aid life-long learners in mastering the basic skills of digital literacy. For example, the Chicago public libraries offer a program called "CyberNavigators"[13], through which small groups and individuals are taught basic computer skills, including online research and how to give presentations. The SeniorNet organization[14], a non-profit, and various similar organizations, offers older adults courses and resources that enable them to acquire basic digital literacy skills. Common Sense Media, another non-profit, offers parents a roadmap[15] for educating kids about digital literacy.

In other cases, industry or professional organizations promote responsible online behavior and digital literacy education. Microsoft offers free online courses for adults that scaffold users through the various levels of digital literacy[16]; Scholastic guides

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[1] digitallearning.macfound.org
[2] http://www.nmmlp.org/
[3] http://www.consortiumformedialiteracy.org/
[4] http://www.goodworkproject.org/research/digital.htm
[5] http://iremix.org/
[6] https://digitalcommons.georgetown.edu/blogs/msfs-556-spring2009/syllabus/
[7] http://cyber.law.harvard.edu/teaching/courses/2010/spring/cybercrime
[8] http://www.chass.utoronto.ca/~wellman/courses/soc356-05.htm
[9] http://ischool.umd.edu/courses/syllabi.shtml
[10] https://wiki.umn.edu/viewauth/CSci5980DIW/WebHome
[11] http://people.ku.edu/~nbaym/COMS620S10.htm
[12] http://smg.media.mit.edu/classes/DesignSocMedia08/
[13] http://www.chipublib.org/eventsprog/programs/cyber_nav.php
[14] http://www.seniornet.org/index.php
[15] http://www.commonsensemedia.org/rules-road-parents-digital-age
[16] http://www.microsoft.com/about/corporatecitizenship/citizenship/giving/programs/up/digitalliteracy/default.mspx

educators in setting school technology policies[17]; and the American Library Association (ALA) creates standards for literacy competency standards for higher education[18].

The examples in this section illustrate ways that digital literacy and TMSP learning is already penetrating educational institutions across the country. Yet, it is happening sporadically, in places where the community and the school systems are intentionally engaged. We outline a plan to extend these local initiatives to nation-wide curricula that will enable continuous learning and appropriation of TMSP skills at all age levels and in all educational settings.

Educational Curricula for a Technology-Mediated World

Formal educational experiences must provide a foundation for building these competencies from the earliest ages on. We examine four phases of formal education: K-12, undergraduate liberal arts programs, undergraduate and graduate professional programs, and PhD studies, and make recommendations for designing appropriate TMSP curricula for each.

K – 12

In 2015, up to 58,000,000 children in the U.S. will attend grades K-8.[19] . This demographic will represent roughly 18% of the population in the U.S.[20] and one for whom formative education and training is essential. Curricular standards that prepare children to participate in a technology-mediated society are a critical and immediate need for this group.

Preparing individuals to participate in technology-mediated spaces begins with early educational experiences. *In kindergarten through the 6th grade, we recommend that curricular goals emphasize information access and information literacy.*

Learning goals associated with information access at the K-6 level include understanding the risks and benefits of putting information online, and identifying and handling unfamiliar situations. The Internet Safety Technical Task Force of the Attorney General Office determined that bullying and harassment are the most frequent threats that minors face both online and off[21]. Young children would benefit from guidance about how to respond if they feel uncomfortable about their treatment by peers, adults or strangers.

Information literacy has been recognized by the Obama administration as a fundamental literacy skill alongside reading, writing and mathematics[22]. Information literacy skills such as finding, assessing and contributing to information resources are a fundamental

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[17] http://www2.scholastic.com/browse/article.jsp?id=3748912
[18] http://www.ala.org/ala/mgrps/divs/acrl/standards/informationliteracycompetency.cfm
[19] http://nces.ed.gov/fastfacts/display.asp?id=65
[20] http://www.census.gov/population/www/projections/projectionsagesex.html
[21] **Palfrey** J. & Gasser U. (**2008**). **Born digital**: understanding the first generation of Digital Natives
[22] http://www.whitehouse.gov/the_press_office/Presidential-Proclamation-National-Information-Literacy-Awareness-Month/

component of participation in technology-mediated spaces. Elementary school children need to become practiced not only in identifying relevant information, but should also raise the question of quality and begin to view themselves as contributors to community information resources. TMSP efficacy at this level would involve identifying user-generated content versus mediated content, basic participation in social media (games, forums, etc) and developing perspectives on the possibilities of TMSP.

In the "middle school" years, TMSP curricular goals include a greater emphasis on self-presentation and etiquette while continuing to address access, literacy, and participatory skills [2]. As children become active Internet users, skills like how to ask questions, find and synthesize relevant resources, connect to people and networks, and present themselves online become critical.

Although young people begin to establish an online presence using social media at early ages, as individuals move into pre-adolescence, self-presentation and identity exploration become increasingly critical features of development [3]). Educational experiences that include opportunities for educators and mentors to facilitate reflection on how students present themselves in technology-mediated spaces can enable them to understand how actions in the online world affect both how they are perceived by and how they affect others.

During this time period, learners should also become more sophisticated in their consumption and engagement of TMSP materials. Students would benefit from learning things like how they can get support, learn about new opportunities, communicate with distant friends and relatives, or other advanced uses of TMSP tools. In addition, students of this age group will become increasingly active in creating content in social media, through participation in structured forums, creation of audio-visual content, and commenting on the work of others. Importantly, students in this age group will need to be learning how to effectively express themselves in online systems.

In 2015, high school attendance will reach roughly 16,000,000. These young American residents will need sophisticated social media skills to enter the workforce and higher education, to participate in civic activities and reach their full potential as creative individuals.

In high school, teens take on increasingly active roles in their communities. Civic engagement at the high school level takes on new forms of voluntarism and awareness. Curricular goals at this level should represent increasingly sophisticated outcomes for active, engaged civic participation. During this time, students will be introduced to skills and topics that will allow them to take full advantage of TMSP tools as both participants and organizers. More sophisticated types of interaction can be aligned with existing high school curricula. Examples could include vetting and steering online community discussions about U.S. government, online debates about local community and civic decisions, engagement with family and community through new forms of participation, or supporting causes and service that serve the individuals and community around them.

High school TMSP learning increases the focus on skills and knowledge to be effective participants and organizers.

Efficacy is an individual's ability to affect change. High school students begin to see themselves as active members of their respective communities and become able to strategically use social media in their personal lives. As high school students approach graduation, some will move into the workforce, others will pursue vocational training or higher education. Many of these young adults will contribute within systems of economic production that we are just now becoming able to envision—forms of production that require innovative thinking about cooperation, intellectual property and creativity [4]. Taking an active role in communities through TMSP takes varied forms, including engaging in political discussions, organizing local events and activities, or contributing to and sharing creative works with others.

TMSP education in high school may also be a good way to introduce students to computational thinking. Effective TMSP processes involve computers not only as a medium of communication but also as providers of computational services. For example, bots can perform calculations to aggregate votes and ratings, to monitor for specific events and alert people about them, and to match people with other people and with tasks. As natural language processing continues to improve, bots that analyze, annotate, and summarize online conversations are likely to become pervasive. Understanding the capabilities of the computation components of TMSP processes will enable high school students to be more effective participants and organizers. It will also provide a motivating framework for introducing core computation concepts such as conditional execution, event-triggered execution, and iteration.

One threat to the vision of K-12 TMSP education is that many K-12 school systems in the United States block access to online systems that are part of the TMSP ecology. Policies that restrict student access to social media in educational contexts create an abstinence culture in which social media use is considered taboo and may contribute to the perception that social media should not be used for learning or civic engagement; in such settings social media is often considered frivolous. Students need to be able to access new forms of social media (today these include YouTube videos, Wikipedia pages, blog entries, and the like; in five years there will be others), to learn by example how to participate effectively and safely [5]. Likewise, K-12 teachers need this access to to engage in innovative teaching practices that take advantage of TMSP. To support the curricular goals above, schools need to adopt technology policies that enable civic participation through social media and allow students and teachers to use and manage their own network-enabled technologies when possible.

Undergraduate Liberal Arts Education
By 2015, approximately 20,000,000 American residents will be enrolled in colleges and universities[23]. Reports show that college students are already heavy users of social media, and that they use these tools to accomplish a variety of tasks, including social

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[23] http://nces.ed.gov/pubs2006/2006084.pdf

participation [6]. TMSP skills, and increasing the efficacy with which students can map these tools to a variety of problems, are a fundamental aspect of college education regardless of specialization or major. In addition to the skills identified in the above sections, *college grads should be adept in using social media to accomplish professional ends, engage in social participation, and help other disciplines use TMSP*. Consistent with the liberal arts agenda, biologists, managers, engineers, teachers and other professionals become able to see the possibilities of using TMSP in creative ways within their respective disciplines.

Some of this training will happen in college courses that specialize in TMSP issues; however, in order to create effective curricula that yield savvy graduates, TMSP skills must be treated as general literacy skills that are pervasive throughout students' college experiences. Just as proponents of writing-across-the-curriculum suggested that English skills could not be taught effectively if such learning is restricted to English class, TMSP skills can and must be required in a variety of courses. In order to facilitate this goal, we propose the establishment of campus "social media support centers" that will assist students who need TMSP training much as existing "writing centers" support students' efforts to become effective writers. We envision TMSP centers that also serve as a resource for faculty, providing resources and models for integrating social participation into their courses.

TMSP Practitioners/Specialists – Bachelors and Masters Programs
As the number of organizations and contexts that require TMSP skills increases, the need for professionals with these skills is growing dramatically. However, there is a significant shortage of people who have the necessary bachelor's and master's level training to design, deploy and maintain the socio-technical systems that enable TMSP in schools, government, business, nonprofit, civic, and other contexts.

In order to meet this increasing demand, it is necessary to have formal academic programs that train TMSP specialists. Currently, programs in computer science and information technologies occasionally fill these needs; however, they are rarely designed with TMSP in mind. We envision programs that address both technical and social issues. Graduates of these programs will service their organizations and communities as frontline facilitators and educators for the implementation of TMSP. This involves educating professionals in the technical design, construction, preservation and maintenance of these systems. This will require an understanding of computation thinking, in order to imagine possibilities and assess limitations. It also involves education about social aspects such as privacy, safety, intellectual property, copyright, self-representation, policy, group dynamics, online addiction, virtual community design, and a host of other issues which are still coming to light. Examples include programs in our home colleges and universities. For example, the University of Michigan has an undergraduate informatics program[24] with a focus in social computing as well as a master's degree specialization[25], Michigan State University has an undergraduate program in Media and Communication

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[24] http://informatics.umich.edu/
[25] http://si.umich.edu/msi/sc.htm

Technology[26] with a heavy emphasis in social media, and Carnegie Mellon has a Social Computing track for its MS (and PhD) programs[27]. These programs draw from a number of disciplines like social psychology to teach students how to model and evaluate social media sites and platforms, often with social participation as a core context for that work. New educational resources are also beginning to emerge such as Easley and Kleinberg's undergraduate textbook [7] bridging networked behavior with theories of economics and social science (and their immensely popular interdisciplinary undergraduate course at Cornell which had 450 students enroll), or NodeXL, an open-source network analysis tool that is targeted not only at professionals but also at students with little experience in Social Network Analysis [8].

As part of TMSP, we also need students who can build, develop, and deploy technologies for civic participation. Some students need to have technical knowledge from disciplines like Computer Science and Engineering. This aligns with other national initiatives that are looking at the role of social media in computing and computer science more generally such as the HarambeeNet project at Duke University.[28] The blend of computer science and social science offers mutual benefits for understanding civic participation on a large scale (or on a local scale) and designing tools to make it better. Designing for civic participation may also provide motivating contexts for broadening participation in computing and technical fields [9], which has been a long-standing problem of national concern in both K-12 and higher education in the U.S.[29]. Another model for integrating computer science and degrees that focus on social participation is the Knight Foundation Scholarship at the Medill School of Journalism at Northwestern University. These scholarships are for Masters education in journalism for people with a computer science or developer background[30].

Doctoral Education in TMSP
TMSP education at the doctoral level spans a broad array of disciplines and institutions. Programs in computer science, education, communication, humanities, social sciences and information studies, among others, have either developed programs in TMSP issues, or have strong interests in those areas. Many of these programs are interdisciplinary in nature, such as the iSchool consortium schools. For example, UC Berkeley's iSchool fields strong partnerships with the law school and the University of Washington with Library Sciences. Governance and information also have strong overlap as seen in UT Austin iSchool's "Government Information" course[31], University of Maryland iSchool's E-Government concentration[32], and Syracuse School of Information Studies' Internet

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[26] http://tism.msu.edu/
[27] http://www.hcii.cmu.edu/social-computing-courses
[28] J. Forbes, Social Networks as an Introduction to Computer Science (**Poster**), *Proceedings of the Sunbelt XXVIII International Social Network Conference*, St. Pete Beach, Florida, January 24, 2008.
[29] http://archive.cra.org/CRN/articles/may09/taulbee.html
[30] http://www.time.com/time/business/article/0,8599,1902202,00.html
[31] http://www.ischool.utexas.edu/~i382l5pd/su2003/introduction.html
[32] http://ischool.umd.edu/programs/egov.shtml

Governance Project[33], each of which focus on impact, policy, and governance in sites and applications.

Computing departments also offer increasingly broad research directions beyond traditional boundaries, such as UC Irvine's School of Information and Computer Sciences and Georgia Tech's School of Interactive Computing. The Computing Research Association's Taulbee report recently added a 19th specialization called "Social Computing/Social Informatics".[34] Ten out of 1,346 new PhD graduates identified with the track the first time it was listed. We would that number might grow to 100.

Although none of these programs focus solely on TMSP, they share many of the educational goals and social agendas. Looking forward, there will be students from law, education, medicine, business and other disciplines who seek knowledge about TMSP issues that are applicable to endeavors in their primary fields. The need will also increase for the creation of new knowledge concerning emerging technical, social, and policy issues. These programs should encourage students and faculty to tailor programs in innovative and unique ways in response to disciplinary and social needs.

Learning Out of School
Not all of the necessary learning will happen under the auspices of K-12 and college and university degree programs. We suggest opportunities to make use of mass media and social media. We also suggest a role for the cooperative extension service to provide consultation and training in communities throughout the country. Finally, we outline a two-stage process involving *Americorps members* and others who serve as *social media ambassadors* in local communities, utilizing materials and curricula that they help to develop and maintain through an extensive online community of practice. The programs described below create opportunities for computer science and social science majors to put their TMSP education into practice, as through an internship, as well as diffusing the logic and possibility of technology mediation to a much broader audience.

One approach to reach a broad swath of the population in a short amount of time is via broadcast media. This approach engages both traditional media and extends it via social media. Traditional engagement could involve documentary development (e.g., PBS Nova special), embedded plotlines in popular programs (e.g., sitcom plotline (see designated driver, or Numb3rs)), or public service announcements ("Now you know!"). Creative extensions could include a pre-populated library of YouTube based PSAs that would be a definitive reference and seed to catalyze a community for user developed content extension.

Ambassadors
Ambassadors are individuals who have been trained in TMSP to teach broader communities TMSP-related skills. Traditionally, internships in computer science and engineering have not focused strongly on social participation, instead featuring corporate or government experience. (Google's Summer of Code, which pays students to work for

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[33] http://internetgovernance.org/
[34] http://archive.cra.org/CRN/articles/may09/tables1to8.html

a summer on open source projects, is an exception.) For both computer science students, and others who are learning TMSP-related skills, internships in the nonprofit sector may provide valuable opportunities to combine technology skills with social participation in "real life" environments. An ambassador might go into a school's parent support group to teach parents TMSP with a focus on parenting strategies, or visit a church gathering and teach members about TMSP, or visit a senior center and teach older users about TMSP. The goal of the ambassadors program is to train a nation-wide network of individuals who can reach people in their local communities. As growing and emerging populations of Internet users gain access, the need for an infrastructure of trained ambassadors who can teach TMSP-related skills becomes pressing.

While the concept of a network of ambassadors to teach TMSP to everyone has not existed in the U.S., a number of organizations grew in the 1980s to support different sectors of society in computer and technology setup and use. Some of these targeted sectors included schools, libraries, and nonprofits. This section describes some of the successes and challenges of those initiatives.

CompuMentor was one of the earliest and longest-running technology assistance programs, founded in 1987 and run until 2008 as a nonprofit that provides technology assistance to other nonprofits and libraries. CompuMentor changed its name in 2008 to TechSoup Global (TSG). TSG has had a major impact; it has partnered with over 30 major corporate providers such as Microsoft and Adobe to provide software and services as donations or at a discounted price. TSG served 45,000 organizations in 2008 and over 100,000 in 2009, enabling recipients to save almost $1.5 billion in 2009[35] [36].
Two of TSG's strengths have been its web site, called TechSoup.org, which provides training webinars and community discussion boards about the use of technology in nonprofit organizations and public libraries, and TechSoup Stock, which helps to connect nonprofits and libraries to product donations from partners like Microsoft and Adobe.

TSG is one example of a kind of Nonprofit Technology Assistance Providers (NTAP). NTAP refers to organizations and individuals that specialize in providing information and communication technology support to nonprofit organizations, through sharing different aspects of technology more freely. Circuit riders, or eRiders, are another form of NTAP. A circuit rider provides consulting and assistance with technology strategy development, and plays a role as part trainer, part management consultant, part computer expert. Circuit riders make multiple visits to the organizations they serve and can serve regional constituencies by travel from a central location. One benefit of circuit riders is that they can "cross-pollinate" the groups they serve, sharing insights, tools, and advice as they travel throughout the sector. In addition, training materials and resources can be used at multiple sites, which distributes the development cost out across a number of organizations.

Other examples include TechFoundation, a public charity based in Cambridge, MA that provides technology, expertise, and capital to nonprofits and NetDay, an oft-cited event

[35] http://www.nytimes.com/2008/04/13/technology/13stream.html
[36] http://www.sfgate.com/cgi-bin/article.cgi?file=/c/a/2009/03/22/BUJC16E7TN.DTL

established in 1995 that called on technology companies to commit resources to help schools, libraries, and clinics connect to the Internet". In 2005, 20,000 volunteers helped to wire 20 percent of California schools to the Internet and 2,500 wiring kits were donated by telephone companies[37]. Finally, Elevate America[38] is a recent program in Massachusetts developed by Microsoft to provide vouchers for free technology training and certification to residents in Massachusetts. Elevate America is part of Microsoft's Unlimited Potential efforts to provide technology training to at least 2 million people in the U.S. over 3 years across 15+ states. The various forms of technology assistance provision have tended to focus on technology infrastructure (networks, databases) and skills in using applications that support organizations' internal operations. We propose to expand and extend these efforts to focus on the skills of organizing participatory processes.

Our initiative calls for networks of ambassadors who go out and teach local communities of parents, elderly citizens, churchgoers, or other members of society about TMSP. The goal is not to provide software or internet access to people—though this is a critical prerequisite—it is to provide a network of people and resources to facilitate people in learning skills, know-how, and literacy with respect to social media and Internet use. We envision a "teach the teachers" model, where networks of ambassadors are trained then disseminate information through local community networks, organizations, groups, and individuals.

One model we propose is to have AmeriCorps members be trained as TMSP ambassadors. AmeriCorps programs are targeted towards civic education, education, and public service in the U.S. and have served thousands of nonprofit organizations, public agencies, and faith-based organizations nationwide. These range from small community groups to national organizations such as Habitat for Humanity, the Red Cross, and Boys and Girls Clubs of America. AmeriCorps and recruits volunteers annually who help the AmeriCorps members in their service.

These programs act as opportunities to bridge TMSP education from the classroom to the field, across disciplines, and create social good while doing so. This type of experience is tied to "service learning", which creates curricular opportunities to move course material into practice through community engagement. Service learning has been associated with many pedagogical benefits [10], and can help those learning both technology and social participation to connect their education to outcomes.

Another model we propose is to employ Cooperative Extension agents. A hundred years ago, as the nation faced the transition from a largely agricultural and rural society to a technological and industrial world, public universities and the land grant system played a key role. In particular, the cooperative extension service developed with a strong mission to facilitate healthy rural communities. In every state, the land grant universities hired extension agents who offer advice to individuals, community groups, and local government, on issues from agriculture to health and childrearing. Currently,

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[37] http://www.sfgate.com/cgi-bin/article.cgi?file=/chronicle/archive/1996/03/09/MN59762.DTL
[38] http://www.microsoft.com/about/corporatecitizenship/US/CommunityInvestment/elevateamerica.aspx

each state still operates Extension services, usually with offices in every county in a state. These offices are tasked with bringing the expertise of the land grant academic institution to the local communities, and offer education programs in everything from agriculture, to obesity prevention, to credit counseling and local economic development. Cooperative extension has started to engage in TMSP activities, for example in the AdvanceMichigan[39] project, which is a crowd-sourcing attempt to identify Extension priorities in Michigan. However, Extension could also be a valuable resource in placing TMSP education into the hands of local users who may not normally intersect with other forms of educational institution.

Funders and other stakeholders
Education in TMSP can both advance and be advanced by integration with many organizations and agencies who do work heavily dependent on collaboration.

For example, recent investments have been made by NTIA and BTOP in broadband infrastructure in many areas of the U.S., with additional investments in public computing centers (like libraries) and adoption of anchor institutions (like hospitals, schools and government). In many of these cases, strong curricula for TMSP issues as described above could help advance the agenda of the broadband implementation.

A wide range of federal agencies could support and receive advantage from investments in TMSP education. The US Department of Agriculture has priorities that include the education of young people in rural areas, the ability of food producers to engage in collective action, and the ability of rural Americans to engage in broader political activities. All of these could gain from a population more educated in TMSP. The National Institutes of Health have recently invested in social media training to connect researchers, medical professionals, public health experts, and consumers in collaborative efforts to improve healthcare. Foundations like Ford, Gates, McArthur and Kellogg (among others) have funded recent projects that either use mediated social participation as core activities, or are dependent on social media for coordination. The National Science Foundation has made several programmatic responses to TMSP education in the recent past, as well as funding Computing Innovation Fellows with research interests in this area. Another NSF program to support this area has been the Research Institute for the Science of Socio-Technical Systems, which brings together senior PhD students, junior faculty and eminent scholars in the field of TMSP to discuss research agendas and build cohorts.

Other stakeholders need to be engaged to accomplish the dissemination of the agenda described above. Within computer science and related fields, many organizations exist whose expertise can be leveraged to enhance TMSP education. For example, the Computing Research Association[40] has long helped propel improvements in education in computer science fields, and would be strong partners in improving graduate education around TMSP. The Institute of Museum and Library Studies is also funding TMSP

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[39] http://advancemichigan.msu.edu
[40] http://www.cra.org/

initiatives to enhance the role of libraries and museums as centers for lifelong learning.[41] This has included funding to rewrite masters curriculum for school media specialists so they would be prepared to serve as TMSP facilitators in their schools.

Call to action

There are many ways TMSP can advance the lives of residents in the United States. Providing access to mobilization, education, social connection and entertainment are just a few of the potential benefits of TSMP in the coming decades. However, to fully realize the benefits of these socio-technical tools, we need to help people understand how to use these tools effectively and safely. Different types of audiences need different skills, but overall there are opportunities to create new literacies that will foster innovation and efficacy in TMSP. In summary, we propose the following steps to advance TMSP education in the United States, at the levels described above.

1) Create an Education collaboratory center that fosters research and program development in TMSP literacy at multiple education levels. This center would be part of a broader network of collabortories on Technology-Mediated Social Participation discussed in other articles in this issue.
2) For K-12 education, this means new curricula that teach students how to both consume, create, and participate in TMSP in effective and safe ways.
3) For general college students, service courses in TMSP need to be created to introduce multiple disciplines to core skills in this area.
4) For the undergrads and MA student specializing in TMSP, there need to be specific majors developed in TMSP skills, as well as increased ties to professional associations that will warrant such programs. In addition, "learning out of the classroom" opportunities need to be made available, integrating course content with service learning opportunities.
5) For PhD level education in TMSP, there are opportunities to build new connections between disciplines by showing the value of this area to a wide set of topics.

In this call for action formal and informal education should not be considered separate. Ambassadors and educators that act outside the formal education system will bring TMSP to wider populations than those who will be addressed by the changing curriculum within the school system. At the same time they themselves will learn and familiarize themselves with TMSP and the needed tools to broaden it. The synergy between formal and informal educational efforts will enhance the way TMSP is perceived and practiced within our society.

[1]   P. Resnick, "Beyond Bowling Together: SocioTechnical Capital," in *HCI in the New Millenium*, J. Carroll, Ed.: Addison-Wesley, 2001.
[2]   H. Jenkins, R. Purushotma, M. Weigl, K. Clinton, and A. J. Robison, *Confronting the challenges of participatory culture: Media education for the 21st century*. Cambridge MA: MIT Press, 2009.

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[41] http://imls.gov/about/21stCSkills.shtm

[3]   E. H. Erikson, *Childhood and Society*. New York, NY: W.W. Norton & Company, 1993.

[4]   Y. Benkler, *The Wealth of Networks: How Social Production Transforms Markets and Freedom* Stanford, CT: Yale University Press, 2006.

[5]   A. Forte and A. Bruckman, "Citing, Writing and Participatory Media: Writing, Citing, and Participatory Media: Wikis as Learning Environments in the High School Classroom," *International Journal of Learning and Media.,* vol. 1, 2010.

[6]   C. Lampe, N. Ellison, and C. Steinfield, "Changes in Use and Perception of Facebook," in *ACM Conference on Computer-Supported Cooperative Work (CSCW)*, San Diego, CA, 2008.

[7]   D. Easley and J. Kleinberg, *Networks, Crowds, and Markets: Reasoning About a Highly Connected World*. New York, NY: Cambridge University Press, 2010.

[8]   D. Hansen, B. Shneiderman, and M. A. Smith, *Analyzing Social Media Networks with NodeXL: Insights from a Connected World*. New York, NY: Morgan Kaufmann, 2010.

[9]   C. Alt, O. Astrachan, J. Forbes, R. Lucic, and S. Rodger, "Social Networks Generate Interest in Computer Science," in *36th Technical Symposium on Computer Science Education*, Houston, TX, 2006.

[10]   R. G. Bringle and J. A. Hatcher, "Implementing service learning in higher education.," *Journal of Higher Education,* vol. 67, 1996.