

# Instilling a Culture of Participation: Technology-Related Skills and Attitudes of Aspiring Information Professionals

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**Abstract.** End users are increasingly frequent contributors to design and development activities. A fundamental necessity to these activities is the existence of a culture of participation, in which users are empowered to solve meaningful problems through technology. This combination of attitudes and skills provides the foundation for end-user-development activity. This preliminary study explores efforts to instill a culture of participation in students training to become information professionals. This demographic is uniquely suited for such research due to students' low incoming technology skillset, educational programs that often fail to heavily cover technology topics, and a high need for end-user-development activities in their future workplaces. This qualitative study explores the evolution of students' skills and attitudes throughout an introductory technology course, finding that common instructional techniques induced positive attitude and skills change in many, but negative or fearful attitudes towards technology were still present, suggesting future exploration is needed in this area.

**Keywords:** Culture of participation · End-user development · Meta-design · Technology education · Library and information science

## 1 Introduction

Until the relatively recent past, the design of technology was a process conducted by experts in a setting remote from the eventual setting of use. As time has passed and technology has evolved, this relationship has shifted, and much more design power is now shared with the end users of the system. End users are now frequent contributors to design and development activities. This may range from the simple (e.g. contributing a product review), to the complex (e.g. creating a functionally new mash-up), and our clear-cut roles of designer and user have subsequently blurred. Currently, some of the most interesting and relevant design problems center on how systems should be designed in a world increasingly full of end-user developer/designers.

Many of these challenges are highly technological, in creating the tools and interfaces to best facilitate these behaviors. However, in tandem with the technological aspects, there are many socio-cultural challenges inherent in instilling a *culture of*

*participation* in potential end-user-developers. These ideas were highlighted in earlier influential works: notably Christopher Alexander's vision of an "unselfconscious culture of design" [1] where users had the skills and confidence to tailor their environment and Ivan Illich's concept of convivial technology tools [11] that would empower people to conduct creative and autonomous actions. These largely theoretical works described a fundamentally different culture of design, one which introduced complex questions around the goal of allowing and encouraging users to act as (and with) designers.

This culture of participation must be in place to shape users with the confidence and skills necessary to take on an active role in shaping their technological environments. One might even make the statement that without the underlying culture of participation, no end user design or development work may take place at all. These ideas are vital to the conceptual framework of meta-design; meta-design theory emphasizes that designers can never anticipate all future uses of their system. Users shape their environments in response to emerging needs and designers must therefore design with future flexibility in mind [e.g. 8, 9]. In 2011, Fischer and Hermann [10] identified key guidelines for the meta-design of socio-technical systems, including the need to *establish cultures of participation*.

This short paper explores an effort to establish cultures of participation in aspiring library and information scientists – a group of unique interest to the end-user-development (EUD) community as this field has become increasingly technology-heavy, with many LIS practitioners engaging in programming-related activities. Both incoming LIS students and current practitioners often lack formal training or background in information technology and some may have a generally fearful or resistant attitude towards technology. However, simply increasing end-user developer participation is not without its own risks; *participation overload* [e.g. 7] is a serious pitfall that may arise where an increasing number of individuals are called on to participate in end-user development activities, including those that may not be highly personally meaningful.

## 1.1 Technology in the Library and Information Science (LIS) Field

To understand the uniquely technological position that LIS professionals take today, and its interest and relevance towards the study of end-user-development, it is necessary to briefly explore the evolution of the use of technology in this field. Libraries have historically been a technological hub for the community, giving many patrons access to the Internet or printing services, during the 1980s and 90s. As library and information science work moved out of the traditional context of the physical library, e.g. into museum, archives, and digital libraries, the technological knowledge necessary for LIS professionals expanded immensely.

In the subsequent years, the explosion of online search and information retrieval tools necessitated a hard look at the function and purpose of the modern library. As technology use expanded outside (and within) the library, an increasing number of library functions and roles dealt directly with information technology, from working with integrated library systems, expanding to new search or discovery systems,

website creation and even extending to mobile app development and the construction and operation of maker spaces [e.g. 2, 4]. Current LIS professionals are often involved in end-user-development activities: namely, creating mash-up web applications and generally crafting solutions from tools designed and provided by others (e.g. using APIs, creating maker-spaces, working with linked data and open source software, etc.) [2]. In particular, creating mash-ups has become a popular means of exposing library-related data to the public and amplifying it with others' data sets, with entire books dedicated to the topic in the context of LIS [e.g. 5].

In contrast to the current state of the field, many students enter LIS programs with little background in information technology and little intent to pursue such a direction, even though their future work may be necessarily technology-centric. Furthermore, LIS students may have completed their undergraduate work in the humanities or other non-technical specialties. This creates a student population with little formal background in information technology and programming, with a relatively short time (approximately 2 years as a full-time student) in a master's program in which to expand these skills. In the compressed time-frame of a master's program, technology-intensive courses must often complete with courses covering a more traditional LIS curriculum [4].

## 2 Research Study Design and Results

The research methods applied in this preliminary study were targeted towards 1) understanding the initial technological competencies and attitudes of incoming students and 2) assessing changes in attitudes and skills over the period of a 17-week semester. The participants were 31 LIS graduate students enrolled in two sections of the introductory technology course. At the beginning of the semester, students were asked to self-report their technology skills and interests. The findings indicated that few had significant technology experience (Table 1) and most of the experience reported was performed in the role of user.

**Table 1.** Self-reported technology experience at the beginning of the semester

<b>Technology-related experience</b>	<b># of Students</b>
User role only (e.g. user of office productivity software, email applications, writing blogs)	17
Basic developer skills (e.g. simple HTML markup, customization on blogging platforms, web design)	13
Intermediate developer skills (e.g. e-commerce, programming, interface design skills)	1

The course included a dense 6-week module focused on building students' web design skills. During this heavily hands-on module, students were exposed to concepts such as client-server architecture, file formats, and character encoding, in addition to basic web design and development skills (e.g. hand-coding HTML/CSS/Javascript, working with text and WYSIWIG editors, and graphics editors). For the majority of

students, these concepts were challenging and the pace of the course was generally reported as fast, but accessible.

At two points during the semester, students were asked to anonymously answer several questions targeting their thoughts and feelings towards technology. At the culmination of the intensely hands-on portion of the semester, the survey results were transcribed and assessed through qualitative coding and thematic analysis (Table 2). Students' comments often expressed multiple themes of interest to the study (e.g. one student expressed an increasing understanding of the technological demands of the field as well as a lingering negative attitude towards technology – *"I'm beginning to feel much more comfortable with the idea of having to be well-versed with certain technology in order to meet career goals...Still mildly afraid of computers."*)

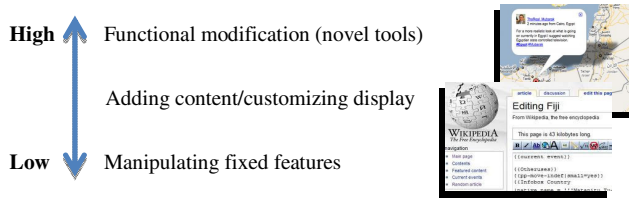
**Table 2.** Themes expressed in students' final responses

Theme	Code	Frequency
Positive	General positive attitude towards technology e.g. <i>"I'm excited about technology, it seems much more accessible than I ever imagined."</i>	12
	Increased confidence and comfort e.g. <i>"I definitely feel more confident in my tech skills"</i>	7
	Increased interest/desire to learn more e.g. <i>"I'm encouraged to take more tech classes next semester."</i>	7
Negative	General negative attitude towards technology e.g. <i>"not really a huge fan of technology"</i>	3
	Expressed confusion, feeling overwhelmed or fearful e.g. <i>"I'm feeling somewhat overwhelmed"</i>	7
<b>Total codes observed (N=31 participants)</b>		<b>36</b>

### 3 Discussion

As noted in previous literature [e.g. 12], the LIS demographic may need particular support in overcoming pre-existing negative attitudes or fears towards technology that impede the creation of a culture of participation. These attitudes were apparent at both the onset and completion of the studied introduction to technology course. Despite common perceptions that the younger populations are more tech-savvy, current LIS students (of all ages) do not necessarily have extensive technology experience. A 2013 study of "digital native" librarians revealed that the Millennial generation (born between 1982 and 2001) that is increasingly populating library schools tend to lack more advanced technology skills [4]. The findings suggested that such students "are accustomed to using technology, not creating it or understanding the back end infrastructure" [4]. This emphasis, on using rather than creating, was demonstrated in the incoming students' reported technology experience levels [Table 1 above].

These underlying skills and attitudes have direct implications on the field of EUD and the role of end-user developer. Existing research in this area often assumes that end users transition to developer roles when faced with personally motivating problems that can be tackled using novel technology. End-user-development activity can be considered a spectrum from simple manipulation or customization of fixed features, up to creating (or contributing to) functionality novel systems [Figure 1 below]. It has largely been assumed in the EUD literature that those who are strongly interested and highly personally motivated will make the transition from end user towards end-use-developer along the spectrum; therefore the end-user-developer population inherently consists of the most motivated and confident end users.



**Fig. 1.** EUD activities represented as a spectrum of customization

In the LIS demographic, the work done by information professionals has become intensely and (largely) non-optionally technological. This creates a scenario in which end users that may not historically have been motivated to shift towards developers, find themselves in a situation where such behavior is required of them. For users that lack both the skills and the confidence (i.e. culture of participation) to begin the uphill battle towards developer of technology, in practice this process may currently be too difficult. The rapid adoption of technology contrasted with the relative lack of technology skills in current and aspiring LIS practitioners may make this community particularly vulnerable to the concept of *participation overload* introduced earlier in the paper.

A limitation of the study design was the relatively small group of participants and (due to the need to protect student anonymity) the resulting difficulty in tracking the progression in attitude on an individual level throughout the course. Further research addressing the questions posed below can correct for these potential limitations and further our understanding of end-user development in library and information science:

*What technology teaching tools and approaches are most effective at instilling a culture of participation?* This course employed a wide range of tools and instructional techniques commonly used to teach basic web design concepts (e.g. lectures and hands-on exercises, a diversity of design tools, text and WYSIWYG editors, etc.) Individual differences and motivations likely play a large role in overall success and attitude change during the course, but tools that provide a low barrier to entry and quickly give a sense of accomplishment may be ideal.

*What aspects of the design of the information system affect the attitudes of end-user developers towards technology?* Open source software products are very common within the LIS field and may generally lack the user-friendly interfaces to support novice users in gaining confidence and control over the system.

*How can participation overload be effectively managed in this demographic?* In a scenario where information professionals may be increasingly pushed towards becoming end-user developers, managing participation overload becomes a serious concern. Supporting LIS professionals with useful EUD tools and educational practices serves to facilitate the creation of a healthy culture of participation.

## 4 Conclusion

This research study begins to explore the process of fostering a *culture of participation* in students preparing to play diverse roles in increasingly technology-heavy information organizations. Despite assumptions that younger generations are inherently more technologically proficient, this and previous studies have shown these groups to have experience largely as users, not developers, of technology. This has serious implications for the field of library and information science which encompasses diverse and complex scenarios of technology use. These include frequent challenges in working with mash-ups, APIs, open source software, open data, and other technologies that have historically been of great interest to the EUD community. As the previous discussion section explores, there are several intriguing questions identified by this research in progress that have wide relevance to the study of EUD and the facilitating culture of participation. As emphasized earlier, an underlying culture of participation is a requirement for supporting end users in solving meaningful problems through information technology.

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