The Differing Technology Support Needs of Beginner and Expert Users: Survey Findings from the University of Washington

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Abstract: Educational technology advances quickly, with new tools and services becoming available. Consequently, users are always trying to keep pace with these new developments. Technology discussions are often most influenced by the needs of experts, since these users are more likely to be the pioneers of new technology. In this paper, we report data from a university-wide survey of faculty, teaching assistants, and students at the University of Washington, Seattle. Our data show that individuals with technical expertise at the "beginner" level rely on different sources of support and encounter different obstacles than do individuals at the "expert" level; for instance, lack of knowledge about where to go to learn about new technology was a significantly greater obstacle for beginners. Overall, our data demonstrate the importance of recognizing a range of expertise within all populations when assessing obstacles and implementing programs to alleviate obstacles related to incorporating educational technologies.

Introduction

Research shows that faculty are fully aware of the benefits of using technology to enhance students' learning, yet many continue to resist adopting the wide range of educational technologies that are available (Sax 2000). This raises the question: what are the obstacles that prevent faculty from adopting technologies? This question is an important one, and has inspired considerable research (Leggett & Persichitte 1998; Pajo & Wallace 2001; Spodark 2003). Among the barriers that have been documented are lack of time, incentive, and support. In order for institutions of higher education to provide essential technology resources and services, it is vital to gather reliable information about the obstacles their users face. To this end, several units at the University of Washington, Seattle (UW) partnered to survey faculty, teaching assistants (TAs), and students in spring 2008 about technology use and needs. In this paper, we discuss findings from our surveys related to technology support and obstacles, which are important issues that transcend the boundaries of our institution.

At technology conferences and at many institutions of higher learning, including the UW, stories of pioneering faculty using new technologies often get a lot of attention and can play a key role in shaping decisions related to technology. These anecdotes often skew discussion in favor of expert users, resulting in the unique needs of individuals with lower expertise receiving less attention. This, in essence, serves to broaden the gap between beginner and expert users. Furthermore, research that investigates barriers to educational technology use seldom considers that these obstacles may be different for those of different levels of technical expertise. Rather, obstacles are considered for the study population as a whole. This is problematic, since the responses of beginner users regarding obstacles are being diluted by the responses of more advanced users. Our survey is unique in that we explore how obstacles affect users differently based on their level of technical expertise. Our data reveal the complexities of technology and support needs and demonstrate the importance of recognizing a range of expertise within all populations.

Methods

Participants

Our faculty recruitment sample included all individuals (3,499) listed as an instructor of record during summer 2007, autumn 2007, and/or winter 2008. There were 119 invalid email addresses in our faculty recruitment sample. For the faculty survey, 547 individuals responded for a response rate of 16.2%. For TA recruitment, we randomly sampled 1,000 graduate students who held teaching assistantships during summer 2007, autumn 2007, and/or winter 2008. There were 45 invalid email addresses in our TA recruitment sample. For the TA survey, 233 individuals responded for a response rate of 24.5%. The student recruitment sample included 5,000 graduate and undergraduate students who were enrolled as of the 10^{th} day of class during spring 2008. There were 260 invalid email addresses in our student recruitment sample. The student survey received 656 responses for a rate of 13.8%.

Procedures

This research involved three phases, beginning with focus group discussions, followed by pilot surveys, and commencing with our principal online survey instruments. During autumn 2007 we conducted 13 focus groups. We held separate focus groups with faculty, TAs, and students; 20 faculty members, 10 TAs, and 20 undergraduate students participated. For the principal surveys, we recruited faculty, TAs, and students via emails that included links to the online surveys. We created and conducted the surveys using an online survey tool developed at the UW (Catalyst WebQ). During spring 2008, we sent a recruitment email and two reminders to all three groups. We also sent a postcard reminder to nonresponsive faculty. The surveys were confidential, with no identifying information linked to individual responses.

Survey Questions

Each survey included questions about technical expertise, teaching and learning contexts, technology use, supports and obstacles to using technology, opinions about technology, and priorities for the future. In this paper, we focus on findings related to three sections of the surveys: (1) technical expertise; (2) sources of support for using technology; and (3) obstacles to using technology.

In order to assess expertise we asked all respondents to rate their technical expertise on a scale from 1 to 5. We defined three points on the scale to assist participants in their response. *Beginner* was defined as (1) “Able to use a mouse and keyboard, create a simple document, send and receive email, and/or access Web pages;” *Intermediate* was defined as (3) “Able to format documents using styles or templates, use spreadsheets for custom calculations and charts, and/or use graphics/Web publishing software;” and *Expert* was defined as (5) “Able to use macros in programs to speed tasks, configure operating system features, create a program using a programming language, and/or develop a database.” In order to assess attitudes about supports, we asked respondents to rate the helpfulness of various sources of technical support on a three-point scale: (1) not helpful; (2) moderately helpful; (3) very helpful; respondents could also indicate if they had never used a particular support. Sources of support included: “Self (trial and error),” “UW online help or tutorial,” and other similar items (Tab. 1). We assessed perceived obstacles by asking respondents to indicate the significance of various obstacles in regards to their use of technology on a three-point scale: (1) not an obstacle; (2) minor obstacle; and (3) major obstacle. For instance, for faculty and TAs obstacles listed included “Lack of time to learn how to use the technology” and “Lack of knowledge about how to use technology to achieve [their] goals” (Tab. 2). Participants were grouped into the following categories based on their self-reported technical expertise: beginner (responses of 1 or 2); intermediate (3); and expert (4 or 5). Expertise groups were compared in regards to their responses to the obstacle and support items using the Kruskal-Wallis statistical test (Tab. 1 and Tab. 2).

Results

Supports

Faculty, TAs, and students all rated *people* as the most helpful sources of technical support, rather than online information or formal training options. For faculty, the three most helpful sources of support were as follows: self (trial-and-error) (mean of 2.3; used by 98.5%); teaching assistants (2.3; 52%), and departmental support staff (2.3; 83.4%). Overall, faculty responses indicated that they first looked to themselves, then to knowledgeable peers (colleagues and departmental support), and next to easily accessible information (online). The three most helpful sources of support for TAs were also the most used sources of support: self (trial-and-error) (2.5; 97.8%); other graduate students in their department (2.4; 88.3%); and friends (2.3; 67.8%). For students, the top three were self (trial-and-error) (2.4; 98.0%); classmates (2.4; 92.5%); and friends (2.4; 87.8%). While these overall trends are useful, a breakdown of helpfulness of technical support by expertise provides a more practical glimpse of where groups that vary in level of expertise seek help and which support they find most helpful.

For several support items we found statistically significant differences comparing expertise groups (Tab. 1). Faculty who rated themselves at a beginning level of expertise (1 or 2 on our five-point scale) were more likely to find "teaching or research assistants" helpful than did experts (4 or 5 on our five-point scale). In fact, both beginner and intermediate faculty users found their TAs to be more helpful than learning via trial and error; this was not the case for expert users. There was a similar pattern for students: beginner and intermediate student users rated support via trial and error lower than the help they received from their friends, though expert users found their friends less helpful. While non-expert users tended to seek help from their friends, expert users found trial and error and online resources considerably more helpful. For all groups, experts rated learning via trial and error and non-UW online help significantly more helpful than did beginners. For TAs, those who ranked themselves at the intermediate level were more likely to find Classroom Support Services (a UW service unit) and professional societies helpful compared with beginner and expert users. These patterns suggest that support for individuals who vary in their level of expertise may need to be delivered in different ways to be most effective.

	Supports	**Beginner**	**Intermediate**	**Expert**	**Significance***
FACULTY	Self (trial and error)	2.02 (n=91)	2.22 (n=236)	2.61 (n=193)	p<0.001
	Non-UW online help or tutorial	1.80 (n=41)	1.90 (n=143)	2.09 (n=152)	p<0.01
	UW online help or tutorial	1.74 (n=42)	1.96 (n=175)	1.99 (n=142)	p<0.05
	Teaching or research assistant	2.38 (n=48)	2.40 (n=123)	2.14 (n=93)	p<0.05
	Catalyst workshop	1.70 (n=30)	2.04 (n=83)	1.83 (n=46)	p<0.05
TAs	Self (trial and error)	2.05 (n=37)	2.39 (n=105)	2.78 (n=81)	p<0.001
	Non-UW online help or tutorial	1.79 (n=19)	1.96 (n=54)	2.19 (n=69)	p<0.001
	Classroom Support Services	2.05 (n=22)	2.26 (n=54)	1.88 (n=26)	p<0.001
	Professional society	2.22 (n=18)	2.34 (n=29)	2.00 (n=17)	P<0.01
	Your students	2.00 (n=18)	1.90 (n=51)	1.85 (n=26)	p<0.05
STUDENTS	Self (trial and error)	2.27 (n=96)	2.33 (n=310)	2.59 (n=225)	p<0.001
	Non-UW online help or tutorial	1.78 (n=65)	2.05 (n=234)	2.14 (n=182)	p<0.001
	Friends	2.37 (n=87)	2.45 (n=283)	2.27 (n=190)	p<0.001

(1) not helpful; (2) moderately helpful; (3) very helpful
*****Kruskal-Wallis test

Table 1. Supports by Expertise

Obstacles

Technology itself, whether in regards to access or sufficient infrastructure, was *not* the most significant obstacle reported by faculty, TAs, and students; instead the most significant obstacles involved lack of time or knowledge. For all populations, "lack of time to learn how to use the technology" was the most substantial obstacle (2.6 faculty, 2.3 TAs, and 2.0 students). The next highest obstacles for both faculty and TAs were "lack of time to maintain or monitor technology once implemented" (2.3 faculty and 1.9 TAs) and "lack of knowledge about how to use the technology to achieve my goals" (2.1 faculty and 1.8 TAs). For students, two different knowledge-related obstacles came after "lack of time" in their ratings. The first, "lack of adequate training about technology required for coursework" (1.7), involved their own level of knowledge; the second, "inability of my instructor to use technology well" (1.7), involved their instructors' knowledge. It is important to note that students, in general, rated all obstacles lower than faculty did and that TA ratings tended to fall between the other two groups. Again, while these overall trends are interesting, a breakdown of obstacles by expertise provides a more practical glimpse of the effect of expertise on obstacles.

Table 2 shows the obstacle ratings of those faculty, TAs, and students with different levels of self-rated technical expertise. For faculty, we found statistically significant differences comparing those with different levels of technical expertise for most of the obstacle items. Differences between faculty expertise groups regarding 'knowledge" and "time" items were substantial. The three obstacles with the widest gaps between faculty experts and beginners involved lack of knowledge "about how to use the technology to achieve my goals," "where to go to learn the technology, and "about instructional technologies available for use at the UW." Lack of time to "learn how to use the technology" and 'to monitor or maintain the technology once implemented" were also significantly greater obstacles for non-experts. For the latter group, there was a considerably greater "lack of personal motivation" regarding learning a new technology. Concerns about "lack of timely support for technical problems" and "a technical problem affecting my teaching" were also greater for non-expert faculty. In all cases, faculty who rated their expertise at a beginning level were significantly more likely to rate an obstacle as *more severe* than were experts. On the other hand, for obstacles related to technology infrastructure, student access, technical incompatibilities, or departmental incentives there were no significant differences between faculty members with differing levels of expertise.

In general, TAs' patterns closely followed the patterns for faculty described above, with the following exceptions: there was no significant difference between beginner and expert TAs for the item "concern about a technical problem affecting my teaching" and differences between beginner and expert TAs were slightly less significant than they were for faculty for the items "lack of knowledge about technologies available for use at the UW" and "lack of personal motivation" (Tab. 2). Interestingly, only two items showed statistical differences for students: "lack of adequate training on technology required for coursework" and "lack of knowledge about where to go to learn the technology." In both of these cases, however, even the mean for beginners fell below the "minor obstacle" point on the scale (Tab. 2). Overall, we see a general trend that is highly statistically significant across most obstacle items: beginner users rate obstacles greater than intermediate users and intermediate users rate obstacles greater than expert users. These patterns suggest that obstacles for individuals differ greatly due to level of expertise and those developing strategies to approach these obstacles, especially for faculty, should consider these patterns carefully.

Discussion

Educational technology is evolving quickly as new tools and services are increasingly becoming available. Communities of users in universities around the world are trying to keep pace with these new developments. Technology discussions are often most influenced by the needs of expert users, since these users are more likely to be the pioneers of new technology. This pattern of privileging the needs of experts is further confounded by assessments that examine obstacles facing a community of users as a whole, instead of considering that individuals with lower expertise may have different barriers and support needs. Indeed, our results show that the greater obstacles and best support for UW faculty as a whole are not exactly the same as those for the beginner users in our sample. Given this context, the obstacles and support needs of those users who are having difficulty adopting technology undoubtedly receive less attention. Simply put, the support needs of users with less expertise and the obstacles they encounter can be easily overlooked. Our work hopes to make these needs visible.

	Obstacles	Beginner	Intermediate	Expert	Significance*
FACULTY	Lack of knowledge about how to use the technology to achieve my goals	2.54 (n=92)	2.10 (n=233)	1.76 (n=193)	$p<0.001$
	Lack of knowledge about where to go to learn the technology	2.10 (n=93)	1.86 (n=233)	1.61 (n=194)	$p<0.001$
	Lack of knowledge about instructional technologies available at the UW	2.22 (n=93)	1.94 (n=236)	1.76 (n=195)	$p<0.001$
	Lack of personal motivation	1.86 (n=92)	1.52 (n=237)	1.40 (n=193)	$p<0.001$
	Lack of time to learn how to use the technology	2.75 (n=93)	2.71 (n=238)	2.42 (n=194)	$p<0.001$
	Lack of time to maintain/ monitor technology once implemented	2.51 (n=92)	2.30 (n=238)	2.07 (n=194)	$p<0.001$
	Lack of timely support for technical problems	1.99 (n=91)	1.89 (n=232)	1.64 (n=191)	$p<0.001$
	Concern about a technical problem affecting my teaching	1.71 (n=92)	1.65 (n=234)	1.42 (n=193)	$p<0.001$
TAs	Lack of knowledge about how to use the technology to achieve my goals	2.23 (n=35)	1.91 (n=106)	1.53 (n=80)	$p<0.001$
	Lack of time to maintain/ monitor technology once implemented	2.33 (n=36)	1.96 (n=105)	1.64 (n=80)	$p<0.001$
	Lack of time to learn how to use the technology	2.75 (n=36)	2.33 (n=106)	2.08 (n=80)	$p<0.001$
	Lack of knowledge about where to go to learn the technology	2.00 (n=36)	1.74 (n=106)	1.41 (n=80)	$p<0.001$
	Lack of timely support for technical problems	1.71 (n=34)	1.33 (n=104)	1.30 (n=80)	$p<0.001$
	Lack of knowledge about instructional technologies available at the UW	2.06 (n=35)	1.82 (n=105)	1.63 (n=81)	$p<0.01$
STUDENTS	Lack of adequate training on technology required for coursework	1.88 (n=99)	1.80 (n=314)	1.59 (n=231)	$p<0.001$
	Lack of knowledge about where to go to learn the technology	1.82 (n=99)	1.67 (n=310)	1.49 (n=230)	$p<0.001$

(1) not an obstacle; (2) minor obstacle; and (3) major obstacle
*****Kruskal-Wallis test

Table 2. Obstacles by Expertise

In order to narrow the technological expertise gap and encourage the use of educational technologies, the obstacles for “beginners” must be lessened. Simple strategies targeted at those with less expertise are important. For example, getting knowledge to less experienced faculty about the instructional technologies that are available at their institution, where to go to learn how to use these technologies, and how they can use the technologies to achieve their goals could enhance adoption of educational technologies by beginner users. Our data indicate that simply putting information online is not enough, since such resources will most likely reach expert users more than beginners. Data from focus groups and our survey instrument illustrate the importance of formal and informal support networks (specifically knowledgeable peers) in providing information about educational technologies in addition to direct help for beginner users.

In closing, our data show that individuals with technical expertise at the beginner level rely on different sources of supports and encounter different obstacles than do individuals at the expert level. This research demonstrates the importance of recognizing a range of expertise within all populations when assessing and trying to alleviate obstacles related to adopting educational technologies. We believe that our method for assessing differences in technical expertise is robust and highly amenable as a tool for future research. We urge that future studies incorporate an accurate measure of technical expertise and consider individual differences in this regard when understanding obstacles and implementing support structures.

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