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The Effects of Qualitative Overload on Technology Acceptance

Robin R. Pennington
The University of Tennessee

Andrea S. Kelton
University of South Florida

Delwyn D. DeVries
The University of Tennessee

ABSTRACT: Accounting professionals often feel stress from qualitative overload in their jobs. Research in the area of technology acceptance has not considered the potential negative effects of qualitative overload on user intentions. The purpose of this study is to examine the effect of this stressor on intention to use technology. A study was conducted with graduate accounting students using Audit Command Language (ACL) just prior to graduation, proxies for new staff accountants. Results indicate that qualitative overload mediates the relationship between perceived ease of use and intention to use ACL. As the perception of difficulty in using ACL increased, so did the perceived qualitative overload stress which in turn led to a negative relationship with intention to use ACL.

Keywords: qualitative overload; stress; perceived ease of use; technology acceptance; audit command language (ACL).

I. INTRODUCTION

Qualitative overload has been studied in the occupational stress literature and relates to the pressure felt when there is a perception that the task at hand is too complex and that adequate training has not been provided (Ivancevich and Mattenson 1980; Chisholm et al. 1983; Yousef 2002). According to survey research, accounting professionals perceive qualitative overload in their work environments (Sanders et al. 1995; Gavin and Dileepan 2002). The known negative effects of qualitative overload range from job dissatisfaction and unwillingness to be innovative with technology to turnover intentions (Chisholm et al. 1983; Collins and Killough 1992; Yousef 2002; Thatcher et al. 2003). DeZoort and Lord (1997, 46) assert that: "... a potentially important subset of the qualitative overload construct relates to the pressure on professionals to keep up with technological changes within the profession. The effects of this pressure are increasingly salient in the public accounting context as electronic information systems technology permeates the accounting, auditing, and tax environments." However, no research to date has considered the impact of qualitative overload on accountants' intentions to use technology.

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The purpose of this study is to test the effects of qualitative overload on intention to use technology within an auditing context. Qualitative overload is proposed to have mediating effects on the relationship between perceived ease of use and intention to use technology. To test the hypotheses, a study was conducted in which graduate accounting students were required to complete class assignments using Audit Command Language (ACL), a data analysis software application commonly used for auditing tasks (ACL 2001). The results support the mediating effect of qualitative overload, as hypothesized.

The results have interesting implications for both theory and practice. First, this study provides some evidence that qualitative overload has negative effects on intention to use technology and mediates the relationship between perceived ease of use and intention. The role of qualitative overload in the relationship between perceived ease of use and intention is an important link between the stress/pressure literature and the technology acceptance literature. Second, practitioners should be interested in the results because qualitative overload can be somewhat alleviated at the firm level through training or changes in assignments and hiring practices (Gavin and Dileepan 2002; Thatcher et al. 2003). By understanding more about the factors that influence technology use, the results of this study can help increase technology use.

This paper is organized as follows. The next section explains the theory and hypotheses development. The third section describes the method including instrument development. The fourth section presents the results of our study and the final section discusses the results and gives direction for future research.

II. THEORY AND HYPOTHESES DEVELOPMENT

Qualitative Overload

Occupational stress models generally are concerned with the stressor-outcome relationship observed in the work environment. Occupational stress is the negative environmental factors associated with a particular job (Ivancevich and Matteson 1980) which is created when job-related factors (stressors) interact with the individual. The extent of the stress depends on the individual. In general, a certain amount of stress is considered beneficial while too much stress often results in negative outcomes (Ivancevich and Matteson 1980). Prior research has identified and categorized stressors in different ways (Thong and Yap 2000). One commonly used scale, the Stress Diagnostic Survey (SDS), indicates the degree to which certain individual level stressors are sources of stress (Ivancevich and Matteson 1980). The stressor of interest to the current study is qualitative overload, a subscale of role overload in the SDS.

Research suggests that qualitative overload is a type of "lack of knowledge" pressure. Considered a micro stressor operating at the individual level, qualitative overload results from perceptions of incompetence when dealing with overly difficult and complex job tasks and/or the lack of training and experience needed to complete a job task properly (Collins and Killough 1992; Thatcher et al. 2003; Yousef 2002). Therefore, stress is created as a result of the individual interacting with a job in which the requirements exceed the individual's ability or skill level (Sanders et al. 1995). Qualitative overload is associated with many negative outcomes such as job tension and job dissatisfaction (Chisholm et al. 1983; Collins and Killough 1992; Yousef 2002), willingness to be innovative with technology (Thatcher et al. 2003), persistent expectations (Ho et al. 2003), and propensity to leave public accounting (Collins and Killough 1992). In a recent study, Ahuja and Thatcher (2005) show that qualitative overload is related to trying to innovate with information technology, although the effect differs depending on gender and is somewhat moderated by increased job autonomy.

Accounting professionals are vulnerable to qualitative overload from pressure to keep up with technological changes (DeZoort and Lord 1997). Survey research indicates that staff and senior level accountants report higher levels of qualitative overload than managers (Sanders et al. 1995) and management accountants who work long hours are more sensitive to qualitative overload (Gavin and Dileepan 2002). Considering the prior research that documents the negative effects of qualitative overload and the increasing pressure for professionals to use information technology, it is useful to consider this construct and its effects on technology acceptance in an audit setting.

Technology Acceptance

Technology acceptance research seeks to understand what factors influence the use of technology (Legris et al. 2003). Throughout the technology acceptance literature several models have been proposed and tested, such as the Technology Acceptance Model (TAM) originally proposed by Davis (1989) and Davis et al. (1989). Recently, in an effort to integrate all the elements of the various models, the Unified Theory of Acceptance and Use of Technology (UTAUT) was proposed and tested (Venkatesh et al. 2003). Most models agree that a well-established predictor of technology usage is intention to use technology. Factors commonly found to have a direct effect on intention to use technology include constructs associated with performance expectancy (such as perceived usefulness, extrinsic motivation, job-fit, relative advantage, and outcome expectations), effort expectancy (such as perceived ease of use, complexity, and ease of use) and social influence (such as subjective norm, social factors, and image) (Venkatesh et al. 2003). Among these various factors, the construct of interest to the current study is perceived ease of use because it has implications to entry level accountants/auditors as they consider using new technology tools. Venkatesh (2000, 240) describes perceived ease of use as "the extent to which a person believes that using a technology will be free of effort" (see Davis [1989] for the detailed theoretical development of the construct).

Perceived ease of use has been found to directly affect the intention of staff auditors to use an electronic audit workpaper system to prepare audit workpapers, although more experienced auditors performing a review were not influenced by perceived ease of use (Bedard et al. 2003). Thus, the perception that a computerized audit system is difficult to use may result in less use of that system.

As mentioned previously, perceived ease of use is the degree to which one believes that using a technology will be effortless (Venkatesh 2000). When perceived ease of use is low then the task can be considered difficult and requiring more effort. Users' perceptions of ease of use are assessed after completing a task using the technology. Qualitative overload results from an individual's perception that they are incompetent or lack the skills necessary to perform the task (Collins and Killough 1992) (i.e., the task is too difficult). Perceptions of qualitative overload are assessed after the individual interacts with the work environment. Thus, when perceived ease of use is low, qualitative overload would likely increase because the individual views the task as more difficult and feels less equipped to deal with the difficult system.

Without exposure to the task, perceptions about perceived ease of use and qualitative overload are likely to be inaccurate. Hence, the link between these variables and intention to use should become stronger with exposure. Individuals would likely desire to be more competent on harder to use systems and, holding training constant, feel under-qualified leading to feelings of qualitative overload. In an audit setting, auditors who perceive a computerized audit tool as difficult to use are more likely to experience feelings of qualitative overload associated with the task. Therefore, we hypothesize when perceived ease of

use is low (i.e., the technology is perceived as hard to use), that this will be associated with qualitative overload in having to deal with a difficult task. Formally stated:

H1: Perceived ease of use is negatively related to qualitative overload.

The findings of the prior research indicate that qualitative overload leads to a variety of negative effects (French and Caplan 1972; Chisholm et al. 1983; DeZoort and Lord 1997; Collins and Killough 1992; Thatcher et al. 2003; Ho et al. 2003). In particular qualitative overload leads to job dissatisfaction and a reduced intention to be innovative with technology (Collins and Killough 1992; Thatcher et al. 2003). We extend this notion by considering that when low perceived ease of use causes users of technology to experience qualitative overload, they also are likely to be dissatisfied with the technology thus leading to a low intention to use the technology. That is, we posit that qualitative overload mediates the effect of perceived ease of use on intention to use the system. In this perspective, qualitative overload is a reaction to the technology that leads to a second order reaction of lesser intent to use the technology. Individual reactions to using information technology affect intentions to use information technology (Venkatesh et al. 2003). Therefore, we hypothesize that qualitative overload will negatively affect intention to use the technology. Formally stated:

H2: Qualitative overload is negatively related to intention to use.

Considering both hypotheses, H1 and H2, simultaneously, qualitative overload is hypothesized to mediate the relationship between perceived ease of use and intention. Therefore the effect of H1 and H2 is to describe a mediation model where qualitative overload mediates the relationship between perceived ease of use and intention.

III. METHOD

A study was conducted at a large southeastern university in which graduate accounting students were required to complete class assignments using ACL[1]. This application is used by many future employers of these students and was appropriate for the audit task simulations conducted during the class. Use of the ACL software was also a relevant setting for examining qualitative overload, perceived ease of use, and intention in an audit context.

All subjects completed a total of three ACL assignments and a hands-on exam during the semester. Data were collected using a questionnaire administered at the end of the semester. All subjects had experience with ACL in a master's level course two semesters prior to the current semester consisting of an introductory, scripted tutorial and a single assignment using ACL to perform a cash account reconciliation. Hence, the participants had limited but sufficient knowledge of ACL to judge perceived ease of use.

Subjects

The study's participants were 43 Master of Accountancy (MAcc) students (see sample characteristics in Table 1). The students were enrolled in their last required course of their final semester prior to graduation. Approximately 80 percent of the students were starting

[1] ACL (Audit Command Language) is a software tool for data extraction and analysis used to perform various audit tasks such as sampling, summarizing, aging, and classifying (ACL 2001).

TABLE 1
Sample Characteristics

	Mean	Standard Deviation	Min	Max
Age	23.65	1.99	22	32
Accounting Courses Completed	13.93	1.78	10	20
	n	**Percent**		
Gender				
Female	20	46.5		
Male	23	53.5		
Accounting/Auditing/Information Systems Internship Experience				
Yes	20	46.5		
No	23	53.5		

positions in public accounting shortly after graduation. Thus, these students are representative of new staff accountants just prior to entering the workforce. Additionally, approximately 46 percent of the students had experience in accounting/auditing/information systems as either staff or as interns prior to enrolling in the course. Previous research suggests that new professionals are particularly at risk for qualitative overload (DeZoort and Lord 1997). Thus, graduate students ready to enter the workforce should be appropriate proxies for new professionals.

Task

As mentioned, participants completed three ACL assignments as part of the course requirements. The assignments became gradually more difficult and with greater variability in the number of possible correct solutions. The initial assignment contained a script of audit questions, such as calculating the balance of accounts which are past due, and the ACL commands, i.e., keystrokes, to answer the questions. The second assignment contained similar audit task questions, however, without scripting instructions describing the keystrokes. The final ACL assignment simulated an audit task, requiring analysis of available data files, design and execution of data analysis, and written conclusions. After completing the third assignment, subjects filled out a questionnaire that elicited opinions about ACL (described in the next section). All the subjects chose to participate and they filled out the questionnaire during class time. The research instrument is described in detail below.

Research Instrument

The measurement items presented in the Appendix are adopted from prior literature. Consistent with prior research, items were modified to meet the needs of this study. We adopted items from Venkatesh and Davis (2000) to measure intention to use ACL and the perceived ease of use of ACL. A 7-point Likert scale anchored by (1) Strongly Disagree and (7) Strongly Agree measured all items.

We used three items adopted from Chisholm et al. (1983) to measure qualitative overload.[2] Subjects responded to the items presented in the Appendix after completing their ACL homework assignments. A 7-point Likert scale anchored by (1) Never and (7) Nearly all the Time measured the responses.

Similar to Venkatesh et al. (2003) we used a focus group of five professionals to pretest our instrument to ensure appropriate adaptation of the scales to the context of our study. Feedback from the focus group resulted in minor wording changes, primarily to the instructions.

IV. RESULTS

Descriptive statistics for the constructs are presented in Table 2. PLS Graph Version 3.0 was used to analyze the psychometric properties of the scales (Chin 2001). Due to its component-based estimation technique, PLS places minimal demands on sample size (Chin 1998; Agarwal and Karahanna 2000). As a "rule of thumb" from Chin (1998), the minimum required sample size is equal to 10 times the greater of (1) the largest measurement equation (construct with the most items) or (2) the dependent latent variable with the largest number of independent latent variables influencing it. Thus, the present study's minimum sample size would be 4 × 10 or 40.

First, the item loadings for each construct were determined to be significant and higher than the recommended cutoff of .70 (Fornell and Larcker 1981) (see Table 3). Second, the internal consistency was assessed using the composite reliability of each construct. The composite reliability is interpreted similarly to Cronbach's alpha with values greater than .60 indicating appropriate internal consistency (Fornell and Larcker 1981). As shown in the first column of Table 4, all values are well above .60. Third, to assess discriminant validity, the square root of the average variance extracted (AVE) was compared to the interconstruct correlations. The square root of the AVE should exceed the correlations between constructs (Chin 1998) demonstrating that the average variance shared between the construct and its indicators is greater than the shared variance between the constructs (Agarwal and Karahanna 2000). As shown in Table 4, no correlation between constructs is greater than the square root of the AVE for that construct. Fourth, the AVE was used to test convergent validity by comparing each to a .5 cutoff (Fornell and Larcker 1981). The AVE for all constructs met the criteria. Finally, we present the factor cross-loadings in Table 5. The

TABLE 2
Descriptive Statistics

Construct	Mean	Standard Deviation	Min	Max
Behavioral Intention (*INTENT*)	5.40	1.16	2	7
Perceived Ease of Use (*PEOU*)	3.81	1.18	1	7
Qualitative Overload (*QOL*)	3.26	1.15	1	7

Note: *INTENT* and *PEOU* were measured on a 7-point scale anchored by (1) Strongly disagree and (7) Strongly agree. *QOL* was measured on a 7-point scale anchored by (1) Never and (7) Nearly all the time.

[2] We also collected information on computer self-efficacy for the purpose of determining the discriminate validity of the *QOL* construct. The change in Chi-squared tests resulting from performing confirmatory factor analysis on both constructs using a constrained model (covariance between constructs set at 1) compared to an unconstrained model (covariance estimated) indicate significant support for the *QOL* scale as capturing a unique and distinct construct.

TABLE 3
PLS Outer Model Loadings

Construct	Loading	t-Statistic
Behavioral Intention		
INTENT 1	0.9660	40.75
INTENT 2	0.9511	32.07
Perceived Ease of Use		
PEOU 1	0.8317	11.45
PEOU 2	0.7948	12.56
PEOU 3	0.9429	71.39
PEOU 4	0.9247	54.54
Qualitative Overload		
QOL 1	0.9018	35.50
QOL 2	0.7864	8.01
QOL 3	0.8900	19.84

Note: All loadings are significant at .001
Variable Definitions
PEOU = Perceived Ease of Use;
QOL = Qualitative Overload; and
INTENT = Behavioral Intention.

TABLE 4
Inter-Construct Correlations

Construct	Composite Reliability	*PEOU*	*QOL*	*INTENT*
PEOU	0.929	**0.8758**		
QOL	0.895	−0.596	**0.8608**	
INTENT	0.958	0.408	−0.451	**0.9586**

Note: Diagonal elements in bold are the square root of the average variance extracted (AVE). Diagonal elements (in bold) should be larger than the correlations between the constructs to demonstrate discriminant validity.
Variable Definitions
PEOU = Perceived Ease of Use;
QOL = Qualitative Overload; and
INTENT = Behavioral Intention.

cross-loadings were calculated by correlating the standardized indicators with the construct scores, both obtained from PLS output (Agarwal and Karahanna 2000; Yi and Davis 2003). The discriminant validity of the constructs is shown in Table 5, such that each indicator loads more strongly on its intended construct than on the other constructs in the model (Chin 1998). In summary, the psychometric properties of the constructs perform very well according to the relevant criteria in each of the five tests performed.

Hypotheses 1 and 2, taken together, propose a mediating effect of qualitative overload (*QOL*) on perceived ease of use (*PEOU*) and intention (*INTENT*). Tests for mediation were performed according to guidance provided by Baron and Kenny (1986). The following relationships must be significant in order to establish mediation: (1) independent variable (*PEOU*) and dependent variable (*INTENT*); and (2) independent variable (*PEOU*) and the mediator (*QOL*). Next, if the relationship between the independent variable (*PEOU*) and the dependent variable (*INTENT*) is no longer significant or the strength of the relationship

TABLE 5
Factor Cross-Loadings

	PEOU	*QOL*	*INTENT*
*PEOU*1	0.8317	−0.5399	0.3595
*PEOU*2	0.7948	−0.4411	0.1982
*PEOU*3	0.9429	−0.5911	0.3889
*PEOU*4	0.9247	−0.5014	0.4426
*QOL*1	−0.6662	0.9018	−0.3596
*QOL*2	−0.3506	0.7864	−0.3715
*QOL*3	−0.4699	0.8900	−0.4426
*INTENT*1	0.3954	−0.4853	0.9660
*INTENT*2	0.3860	−0.3691	0.9511

Variable Definitions
PEOU = Perceived Ease of Use;
QOL = Qualitative Overload; and
INTENT = Behavioral Intention.

is significantly decreased in the presence of the significant relationship between the mediator (*QOL*) and the dependent variable (*INTENT*), then mediation is established. Accordingly, we performed the following analysis (see Table 6 and Figure 1). First, we test the relationship between *INTENT* and *PEOU* in which case the coefficient on *PEOU* is statistically significant (.378, $p = .006$). Next, we tested the relationship between *QOL* and *PEOU* in which case the coefficient on *PEOU* is statistically significant (−.587, $p < .001$). Finally, *INTENT* was regressed on both *PEOU* and *QOL*. The coefficient on *QOL* is statistically

TABLE 6
Test for Mediation

Model	Dependent Variable	R^2	Independent Variable	β	p-value	Hypothesis
1	*INTENT*	0.143	*PEOU*	0.378	0.006	
2	*QOL*	0.344	*PEOU*	−0.587	<0.001	H1
3	*INTENT*	0.207	*PEOU*	0.196	0.133	
			QOL	−0.312	0.041	H2
4	*INTENT*	0.182	*QOL*	−0.426	<0.001	H2

3 Step Mediation Analysis (H1 and H2):

$$INTENT = \beta_0 + \beta_1 (PEOU)$$

$$QOL = \beta_0 + \beta_1 (PEOU)$$

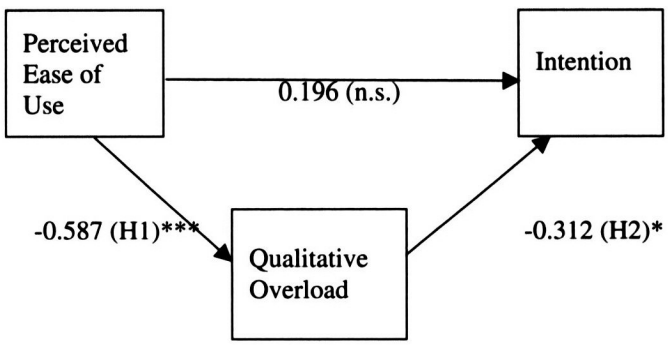
$$INTENT = \beta_0 + \beta_1 (PEOU) + \beta_2 (QOL)$$

H2:

$$INTENT = \beta_0 + \beta_1 (QOL)$$

Variable Definitons
PEOU = Perceived Ease of Use;
QOL = Qualitative Overload; and
INTENT = Behavioral Intention.

FIGURE 1
Mediation Model



***significant at .001
*significant at .05

significant (−.312, p = .041) and the coefficient on *PEOU* is not significant (.196, p = .133). This pattern of results suggest that *QOL* mediates the relationship between *PEOU* and *INTENT*.

As can be seen (Table 6) by the strong negative relationship between perceived ease of use and qualitative overload (−0.587, p < .001), H1 is supported. Subjects who rated the ease of use of ACL to be lower also had higher scores on qualitative overload (i.e., they felt the assignments were more difficult and/or felt they were less qualified). The perceived difficulty of using ACL also affected their perception of the task. Those who found ACL easier to use (scored high on ease of use) had lower scores for qualitative overload.

The relationship between qualitative overload and intention to use ACL is also significant and negative as shown in both regression models 3 and 4 of Table 6 (−.426, p < .001; −0.312, p = .041) supporting H2. Subjects who scored higher on qualitative overload also tended to demonstrate a lower intention to use ACL. Those feeling the pressure of qualitative overload also do not intend to use ACL as much as those who felt less qualitative overload pressure.

V. DISCUSSION

The purpose of this study is to test the effects of qualitative overload on intention to use technology within an auditing context. The results provide initial evidence that qualitative overload, resulting from low perceived ease of use, has a direct and negative effect on intention to use an information system. Although prior research concerning the effects of perceived ease of use on intention has found many moderators (Taylor and Todd 1995; Venkatesh and Davis 2000; Venkatesh and Morris 2000; Venkatesh et al. 2003), this is the first study to consider the role of qualitative overload as a mediator. The results from the mediation tests provide strong support for the hypothesized mediated effect. When the participants in this study regarded the information system (ACL) as harder to use, they also exhibited a strong tendency toward qualitative overload regarding the task that in turn led to a lower intention to use the system. These results have important implications for the user acceptance literature by illuminating the psychological process by which perceived

ease of use influences intention to use. Hence, our results link the literature regarding technology acceptance with the literature regarding the effects of pressure/stress and task performance.

Our results have practical implications for auditors. The mediating effect found in this study indicates that difficulty in using a technology such as ACL can bring about stress and subsequently intentions to avoid using the technology. ACL is a frequently used audit tool for both internal and external auditors (Jackson 2004). Firms should be interested to know what factors encourage intention to use ACL. In particular, companies should note that perceived ease of use affects qualitative overload stress which influences intentions to use ACL. Thus it is desirable that auditors not perceive ACL as difficult to use. One remedy may be to ensure that new professionals are given sufficient time to learn ACL and become cognitively absorbed in their tasks. More experience may reduce some of the perceived difficulty and aid in avoiding the pressures of qualitative overload and its negative effects on intention to use ACL.

There are several strengths to this study. First, this study was conducted using previously validated scales that have well documented construct validity. Care was taken in consulting a focus group of professionals regarding the minor wording changes we made to adapt the instrument to ACL. Second, our graduate student participants represent new professionals quite well given that they were a month from graduating and most of them had already secured professional positions beginning shortly after graduation. Additionally, participants had approximately the same, limited introductory experience with ACL, similar to what new professionals would likely encounter in their first few months on the job. Third, the research instrument was administered during class time ensuring proper experimental control.

As with all experimental studies, care should be taken when generalizing these results to other groups and tasks. In particular we do not know whether qualitative overload mediates perceived ease of use on intentions for more experienced users of ACL. This study focused on a particular group of subjects, new professionals, who are at the greatest risk for qualitative overload (DeZoort and Lord 1997). Survey research suggests that staff and senior level accountants are more sensitive to qualitative overload than managers (Sanders et al. 1995) thus indicating that the effects may change over time. However, management accountants who work long hours also are sensitive to qualitative overload (Gavin and Dileepan 2002). Future research should consider these other groups of professionals and seek to determine if the effects are persistent over time and with different types of technology and tasks.

Another potential caveat is the feedback that the subjects received. Measures of perceived ease of use were obtained after subjects received some initial feedback about their performance with ACL and it is not known if this type of feedback could have an influence on perceived ease use. On the job auditors would likely self-evaluate their performance before receiving feedback from seniors and managers concerning tasks completed with ACL. Much of the research on technology acceptance focuses on users of technology in the workplace and does not study the effects of feedback. More research is needed to understand if performance feedback influences perceived ease of use or other constructs associated with technology acceptance.

Future research should also consider other stress and pressure variables that may impact technology acceptance. For example, role ambiguity, which is the uncertainty associated with job tasks and responsibilities, may have an impact on technology acceptance within

the context of computerized audit tools. Understanding factors affecting technology acceptance is important for audit professionals as they must continually adapt to technological changes within the profession.

APPENDIX

Measurement Items

The following items were measured using a 7-point scale anchored by (1) Strongly Disagree and (7) Strongly Agree:

Intention to Use

INTENT 1. Assuming I have access to ACL, I intend to use it.
INTENT 2. Given that I have access to ACL, I predict that I would use it.

Perceived Ease of Use

PEOU 1. My interaction with ACL is clear and understandable.
PEOU 2. Interacting with ACL does not require a lot of my mental effort.
PEOU 3. I find ACL to be easy to use.
PEOU 4. I find it easy to get ACL to do what I want it to do.

The following items were measured using a 7-point scale anchored by (1) Never and (7) Nearly all the Time:

Qualitative Overload

QOL 1. Not fully qualified to handle your assignment.
QOL 2. The quality of work expected was too difficult.
QOL 3. The assignments required more training and knowledge than you had.

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