STUDENT PERCEPTIONS OF LONG TERM CONSEQUENCES OF COMPUTER USE

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ABSTRACT

Student perceptions of the long-term consequence of computer use are shown in this study to be significantly and positively related to reported computer usage levels. Results support the inclusion of long-term consequences in evaluations of student perceptions of systems, system usage, and assessments of user behavior.

Keywords: Computer Usage, Long-Term Consequences, End-User Computing, System Success

INTRODUCTION

Robey [18] indicates that MIS systems can and do fail when user psychological reactions are ignored by system designers. This statement implies the need for continued examination of the nature of users' *psychology* and the constructs surrounding such examinations.

Interest in the ongoing examination of these psychological constructs stems from the need to improve a generally accepted model of system "success," which typically is operationalized in one of four ways: measures of system quality, measures of changes in user behavior, perceived satisfaction, or user-reported system usage [13]. While the adoption of information technology is associated with a variety of benefits such as improved productivity, improved decision making, and increased effectiveness [7, 15, 19, 24], it is a tool that only yields advantage when it is used [16]. This raises the question – do students see a connection between their current use of computers and the future value of their technical knowledge?

This article examines the relationship between student perceptions of the long-term consequences of using computers and their levels of computer usage. More specifically, the study validates a *Long-Term Consequences* construct and evaluates its effect on student computer usage. This type of examination reinforces the importance of perceptions in system success and expands the understanding of students' psychological reactions to systems.

LONG-TERM CONSEQUENCES

Long-Term Consequences is a construct aimed at measuring the perceived long-term importance attached to computer familiarity and higher levels of computer use. Since actions are perceived as having consequences of potential value [23], it is presumed that individuals will base their actions, in this case the use of computers, on an evaluation of the potential rewards and the desirability of those rewards [21]. The perceived value or benefits derived from familiarity with computers may be realized in the short term or the long term. The long term expectation of future benefits implies that a higher perception of future value and reward should lead to higher current computer usage.

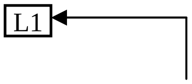
The *Long-Term Consequences* variable is based on a six item construct developed by Thompson *et al*., [21, 22], and is similar to an Instrumentality Beliefs construct used by Hill *et al*. [11]. Thompson *et al*. reported an acceptable reliability level (alpha = .76) for the *Long-Term Consequences* construct in their 1991 study [21] but did not report its reliability when they used the construct again in a 1994 study [22]. This investigation tests a structural model of student perceptions of the relationship between *Long-Term Consequences* and a self-reported three item construct measuring *Computer Usage* as shown in Figure 1.

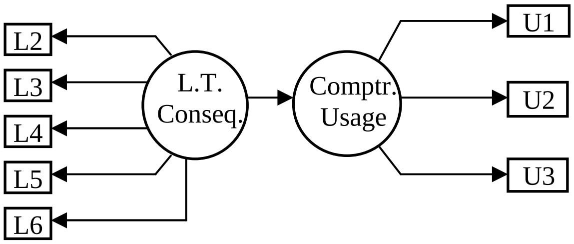
METHODOLOGY

Sample and Procedure

A survey instrument was administered to several sections of an Information Systems Management class at a major midwestern university. The class is required for all undergraduates majoring in business and includes students from all departments within the business school. Each student was asked to complete the survey at the beginning of a regularly scheduled class meeting. No incentives were attached to the completion of the instrument.

Figure 1: Structural Model of Long-Term Consequences and Computer Usage Relationship





Demographic information was not collected. A total of 346 surveys were received, of which 324 were usable. Results of the survey were analyzed using the structural equation modeling program LISREL 8.

Measures

Long-Term Consequences, based on the construct developed by Thompson *et al*. [21, 22] consists of six indicators measured on a 5-point scale ranging from "Extreme increase" to "Extreme decrease." Respondents are asked to indicate the perceived increase or decrease that the use of computers will have on their 1) level of job challenge, 2) future job opportunities, 3) amount of job variety, 4) opportunity for more meaningful work, 5) job flexibility, and 6) opportunity to gain job security.

Computer Usage is derived from the *Usage* construct of Igbaria *et al*. [12] and the *Utilization of PCs* construct of Thompson *et al*. [21, 22]. The construct refers to the level of discretionary computer use and is operationalized with three indicators: 1) frequency of usage measured on a 6-point scale ranging from "Less Than Once A Month" to "Several Times A Day"; 2) intensity of usage measured on a 6-point scale ranging from "Almost Never" to "More Than 3 Hours A Day"; and 3) diversity of usage where respondents list specific software packages used and rate the extent of use of each package on a 5-point scale ranging from "To A Very Little Extent" to "To a Very Great Extent.

ANALYSIS

Unidimensionality

Unidimensionality is a necessary condition for construct reliability and validity. Unidimensionality is demonstrated when the indicators of a construct have an acceptable fit on a single factor model. The evaluation of fit in any one-dimensional measurement model requires a model that is over-identified, with some positive degrees of freedom. In a one-dimensional model, a construct must have more than three indicators to achieve positive degrees of freedom. A construct with zero or negative degrees of freedom (three or fewer indicators) cannot be evaluated for fit [1].

One measure commonly used to evaluate fit is the goodness-of-fit index (GFI). The GFI ranges in value from 0.00 to 1.00, with higher values indicating better fit. For an over-identified measurement model with more than three indicators and positive degrees of freedom, a GFI of 0.90 or higher for the model suggests that there is no evidence of a lack of unidimensionality" [1].

The single factor measurement model for *Long-Term Consequences* has a GFI of .95, indicating that the construct demonstrates acceptable unidimensionality. The U*sage* construct contains only three indicators and cannot be evaluated for fit in a one-dimensional model.

Reliability

Reliability refers to the relative level of consistency, dependability, predictability, and accuracy of a construct [14]. It is a necessary but not sufficient condition for validity [14]. A construct is considered reliable if its indicators explain the majority of the construct's variation [1].

Three methods that are often used to separately assess construct reliability include coefficient alpha, composite construct reliability index, and variance extracted [6, 8, 9, 10]. Coefficient alpha is a general formula for scale reliability based on internal consistency. It provides a lower bound for the proportion of test variance among construct indicators that may be attributed to a single common factor. The composite construct reliability index is computed as the sum of the standard item loadings squared divided by the total of the standard item loadings squared plus the sum of the item measurement errors. The variance extracted is computed as the sum standard squared item loadings divided by the total of the standards squared item loadings plus the sum of the item measurement errors. A construct is considered reliable if it has a coefficient alpha of .70 or higher, a composite construct reliability index of .70 or higher, and a variance extracted of .50 or higher.

Table 1: Analysis of Construct Reliability

Construct	coefficient alpha	construct reliability	variance extracted
L.T. Consequences	.86	.93	.68
Computer Usage	.77	.64	.59

As shown in Table 1, *Long-Term Consequences* exhibits acceptable reliability. *Computer Usage* exceeds reliability thresholds for alpha and variance extracted and is only slightly below the threshold for construct reliability, indicating adequate reliability.

Convergent Validity

Table 2: Analysis of Convergent Validity

\ Construct \ Indicant \	Long Term Consequences	Computer Usage
1	.44 (7.91)	.88 (15.91)
2	.71 (14.07)	.84 (15.20)
3	.77 (15.64)	.53 (9.64)
4	.74 (14.88)	
5	.79 (16.14)	
6	.77 (15.64)	

Convergent validity is exhibited when different approaches to construct measurement yield the same results [5]. One method for evaluating convergent validity views each item in a construct as a different approach to measurement and examines the results of t-tests on the individual factor loadings. If all the t-tests are significant, then all the indicators are considered to be effectively measuring the same construct [2]. Table 2 shows the loadings and associated t-values for the indicators of each construct. T-values greater than 3.29 indicate a significance level less than .001. Table 2 shows that t-values of all indicators are significant at the .001 level, indicating that all the constructs exhibit convergent validity.

Discriminant Validity

Discriminant validity implies that one construct can be empirically differentiated from other constructs that may be similar [14]. Discriminability may be demonstrated with a chi-square difference test among all possible pairs of constructs. In this test, analyses are performed on two models of the selected pair of constructs. The first model allows for free correlation between the constructs, and the second model fixes the construct correlation to one. The constructs are discriminable if the difference in chi-squares between the models exceeds the chi-square critical value for one degree of freedom [1]. The chi-square critical value is 7.88 at the .005 significance level. The chi-squared difference between the Long-Term Consequences and Usage constructs is 314.37 (significant at the .005 level), demonstrating that the constructs exhibit discriminant validity.

Structural Analysis

The structural model in Figure 1 was tested with LISREL 8. Table 3 shows the goodness of fit indices resulting from the analysis, along with guideline values for evaluating the fit of the model to the data [4, 9, 14, 20].

Though always reported, the chi-square test is not considered to be practically meaningful and is typically discounted by researchers in favor of other methods for evaluating the fit of model to data [3]. Except for the chi-square statistic, all the measures indicate that the model provides a good fit to the data.

Since the model fit is acceptable, the factor loading of *Long-Term Consequences* on *Computer Usage* can be evaluated. The factor loading of .28 is significant at the .001 level. This indicates *that Long-Term Consequences* does have a positive effect on increased *Computer Usage*. A pictorial recap of the model's loadings is presented in Figure 2.

DISCUSSION

In this analysis, a LISREL model was developed to examine the validity of the *Long-Term Consequences* construct and its relationship with student *Computer Usage*. This relationship was tested to lend support to the idea that students' perceptions of computing systems are critical to system success (when usage is considered a surrogate for success).

Table 3: Analysis of Structural Model Fit

Goodness of Fit Indicator / Value	Recommended Value	Fit Conclusion
chi-square (26 d.f.) = 83.73 (p < .01)	p > .05	poor
normed chi-square = 3.22	≤ 5	good
GFI = .95	≥ .90	good
AGFI = .91	≥ .80	good
NFI = .93	≥ .90	good
NNFI = .93	≥ .90	good
CFI = .95	≥ .90	good
RMR = .047	≤ .20	good

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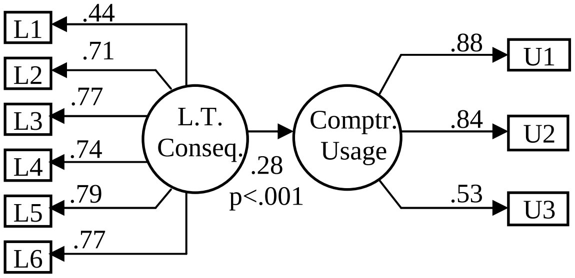
Figure 2: Structural Model of Long-Term Consequences and Computer Usage with Loading



The findings indicate a significant and positive relationship between students' perceptions of the long-term consequences of computer use and their reported levels of computer usage. This provides support for the inclusion of long-term consequences in the evaluation of student perceptions of computer systems and computer use, the assessment of student computer-related behavior, and the determination of how and why students use, or fail to use, a given system. The analysis provides insight into how much of a system's "success" may be attributed to students' *perceptions* of the system being used. Likewise, it has a strong implication for educators to place a greater emphasis on instilling positive perceptions regarding the long-term benefits that may accrue to students through the incorporation of higher levels of computer use.

FUTURE RESEARCH

It is hoped that the examination of perceptual factors affecting student computer usage will continue to be explored in a variety of systems assessment situations. It provides a stable venue for the assessment of student attitudes and perceptions and expands the framework for the study of systems "success." There is also a need for continued investigations of student perceptions that can lead to undesirable behavior that may affect systems success. As Lucas [17] emphasizes, ignoring user behavior problems in system design and operation typically leads to information systems failures. Studies of both perceptual factors that affect computer usage and that may influence system success will be useful additions to the literature.

CONCLUSION

This study provides an analysis of the relationship between the perceived *Long-Term Consequences* of using computers and the levels of *Computer Usage* reported by students. The findings show a strong positive relationship between perceived long-term consequences and self-reported computer use. The psychometric stability of the *Long-Term Consequences* construct used in this study adds support to the importance of the affect that student perceptions have on their use of computers and provides incentive for its continued use, along with of other perceptual factors, in the development of a comprehensive student-centric model of system "success."

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