FACULTY ATTITUDES REGARDING KNOWLEDGE MANAGEMENT SOFTWARE AND ACTIVITY REPOSITORIES

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ABSTRACT

In higher education, technology is impacting how we work and teach. Some technologies are instructional and others are administrative. The research presented below focuses on the case of faculty entering their own historic activities into a faculty activity repository using data and knowledge management software. Faculty perceptions of their self-efficacy and outcome expectancy/usefulness to use the software as well as their attitudes toward the software are measured. Based on social cognitive theory, self-efficacy and outcome expectancy/usefulness are hypothesized to be related to these faculty attitudes. Using 154 responses to a questionnaire distributed to faculty who had used the knowledge management software, the hypothesized relationships were estimated using structural equation modeling. As theory predicts, self-efficacy, outcome expectancy/usefulness, and attitudes were found to be pair-wise correlated in a statistically significant manner.

INTRODUCTION

Technology is embedded in our everyday lives. We are no longer tethered by landlines for making phone calls or wires connected to computers. In higher education, technology is also impacting how we work and teach. Some technologies are instructional (e.g., smart boards, project displays, voting mechanisms) and others are administrative (e.g., accessing travel and grant forms, electronic document and grade submissions). One particular administrative issue where technology is playing a part is assessing faculty activities and program outcomes.

Such assessments require significant data. As a result, a faculty repository has become a valuable asset to colleges and universities. However, their value does not come without a cost. Beyond the expense of the software, hardware installation, and maintenance there are also costs of data entry to populate the repository. Data entry can be problematic, particularly if the faculty activity repository is to include historic data as opposed to data beginning at the current time and moving forward. Furthermore, inputting historic data for professionally active and/or older faculty generates even greater costs. The data entry may be performed by data entry clerks or by the faculty themselves. In the case of the former, there are direct labor costs for the clerks' time. In the latter case, there are opportunity costs as faculty time is drawn away from their typical duties of teaching and research.

The research presented below focuses on the case of faculty entering their own activities into the faculty activity repository. Additionally, this case includes historic data regarding faculty activities being entered into this repository. Anyone who knows faculty, can imagine some of the faculty responses to the request to input their historic activities into the repository. It is these responses which are the focus of this research. It examines faculty attitudes in the context of faculty perceptions of their ability to

successfully use this software, the usefulness of it, as well as faculty experience with computers and the repository software.

THE LITERATURE

Data and knowledge management is important for an organization to perform effectively [17]. Its benefits can be perceived differently by different users of the technology. Predicting and understanding user's beliefs regarding accepting and using technology can be based on self-efficacy or social cognitive theory [2] [3] which is the foundation for the research presented below. The theory [1] [2] links an individual's cognitive state to a variety of affective and behavioral outcomes and predictors of individual behavior [15] [17].

According to self-efficacy theory, expectations (e.g., motivation, performance, and attitudes) determine affective and behavioral reactions in numerous situations including technology systems. If a system is perceived to be useful, a user is more likely to adopt and use the system in the future [10] [16]. If a user perceives they have the skills and abilities to accomplish the task they will also have a higher level of persistence at the task [17]. Today, technology use is often not voluntary. A mandatory system may well inflate the degree of system use, but the perception of its usefulness still persists [8]. Rai, Lang, and Welker [12] defined "quasi-volitional IT use" as system use that is not mandatory, but also not completely volitional because of social pressure and subjective norms in the environment. This means that a user may not be required to use the system but that influences in the environment suggest that it should be used.

Past research has used self-efficacy theory to examine individual reactions in a variety of contexts [6] [7]. These reactions or expectancies were divided by Bandura [2] in two types, self-efficacy and outcome expectancy. Self-efficacy is the individual's belief that he or she has the abilities to successfully accomplish a specific task. Outcome expectancy/usefulness is an individual's belief that task accomplishment leads to a desired result. While self-efficacy and outcome expectancy/usefulness have individual impacts on behavior and effect, self-efficacy typically has a larger effect [2]. It has also been shown that self-efficacy has a direct impact on outcome expectancy/usefulness [16]. Outcome expectancy/usefulness can have positive or negative consequences on behavioral acceptance [9].

Among the antecedents of self-efficacy and outcome expectancy/usefulness is personal mastery [10]. Personal mastery relates to an individual's experiences with the particular software or task or those that are similar. These experiences impact self-efficacy by building the individual's perception that their skills are appropriate to successfully complete the task. Similarly, these experiences help the individual form more accurate perceptions of the outcomes or usefulness from the completion of the task. Furthermore, one type of effect that self-efficacy and outcome expectancy/usefulness influence is the user's attitude toward the task performed.

Based on this literature a model was developed. Faculty perceptions of their self-efficacy and outcome expectancy/usefulness are hypothesized to be related to faculty attitudes regarding the repository as well as two variables capturing personal mastery. These variables are hypothesized to be pair-wise correlated.

THE SAMPLE

The data were collected from faculty at a western university that had adopted a faculty activity repository software program to manage data and knowledge regarding these activities (i.e., The System:

commercial product name redacted). The purpose of The System is to collect and present a variety of faculty performance data, including vitae and annual performance reports. A questionnaire was developed presenting a series of items used to measure the constructs in the proposed model. Respondents were presented a five point Likert-type scale upon which to respond. The scale and weights used were: Strongly Agree-5; Agree-4; Neutral-3; Disagree-2; and Strongly Disagree-1. The questionnaire was distributed to faculty and administrators on the Internet using the survey tool WebSurveyor. The URL for the questionnaire was emailed to faculty through a university list serve. A total of 866 individuals received this email and were asked to participate. The number of usable responses was 154, for a response rate of 17.78%.

Several demographic variables were collected on this sample of 154 respondents. Twenty-seven percent of the respondents in the sample were female and 73% male. Fifty-one percent of the sample respondents reported an age in the 50-59 years old range. The vast majority of the respondents, 86%, held tenure-track faculty positions at the university. The College of Letters, Arts, and Social Sciences represented the largest group of respondents at 26% of the sample while the second largest group was from the College of Agriculture and Life Sciences at 16%. Fifty-eight percent of the respondents reported that they received no training to use The System.

THE MEASURES AND THEIR PSYCHOMETRIC PROPERTIES

In order to examine the psychometric properties of the measures developed from multiple questionnaire items, a confirmatory factor analysis was performed. The confirmatory factory analysis used a structural equations approach (i.e., Calis in PC SAS version 9.2) and maximum likelihood estimation. The three multiple item measures, self-efficacy, outcome expectancy/usefulness, and attitudes were defined as reflective in these questionnaire items. The fit of the model in the confirmatory factor analysis to the data was good as summarized by several statistics. The goodness of fit index was 0.88 and adjusted for degrees of freedom it was 0.82. The root mean square residual was 0.06. The chi-square statistic was statistically significant at 122.63 with 51 degrees of freedom and the normed chi-square was 2.40. Bentler's comparative fit index was 0.95 and the incremental fit measures (Bollen's normed and non-normed and Bentler and Bonnett's normed and non-normed indexes) ranged from 0.90 to 0.95. The estimated path coefficients from measures to indicants were statistically significant at a 1% level. These estimated standardized path coefficients, the corresponding questionnaire items, and the psychometric properties calculated from the standardized path coefficients items are shown in Table 1.

TABLE 1: THE CONSTRUCTS AND QUESTIONNAIRE ITEMS

Constructs and Questionnaire Items	Indicant Estimate	Reliability	Shared Variance
Self-Efficacy		0.78	64%
I could complete a task using The System ….			
1. Using all the capabilities of the system.	0.78**		
2. Because I am more knowledgeable than most other people about this type of system.	0.82**		
Outcome Expectancy/Usefulness		0.97	84%
Using The System……..			
3. Saves me time in my job.	0.88**		
4. Enhances my effectiveness on performing these tasks.	0.95**		
5. Improves the quality of the work I do on tasks.	0.91**		
6. Increases my productivity.	0.94**		

7. Makes it easier to do my job.	0.94**		
8. Overall, I find The System useful in my job.	0.88**		
Attitudes		0.84	57%
9. I feel apprehensive about using The System.	0.62**		
10. It scares me to think that I could lose a lot of information when using The System by hitting the wrong key.	0.82**		
11. I hesitate to use The System for fear of making mistakes I cannot correct.	0.90**		
12. The System is somewhat intimidating to me.	0.65**		
Percentage of Workday Using a Computer			
What percentage of your workday is spent using a computer?			
Number of Hours Spent Using The System			
How many total hours have you spent using The System?			

** Denotes statistical significance at a 1% level.

Based on standardized path coefficients of 0.70 or greater, item reliability was satisfied for all but two items used in the attitudes measure [5]. The reliability coefficients calculated using the standardized path coefficients were 0.78 for self-efficacy, 0.97 for outcome expectancy/usefulness, and 0.84 for attitudes. These values demonstrate that the measures have desirable reliability [11]. Furthermore, the percentages of shared variance for each measure were calculated to be 64% for self-efficacy, 84% for outcome expectancy/usefulness, and 57% for attitudes. These values are greater than the typically used cutoff of 50% and thus demonstrate satisfactory levels of shared variance [14]. From these values, it can be concluded that convergent validity was satisfied for each measure [13].

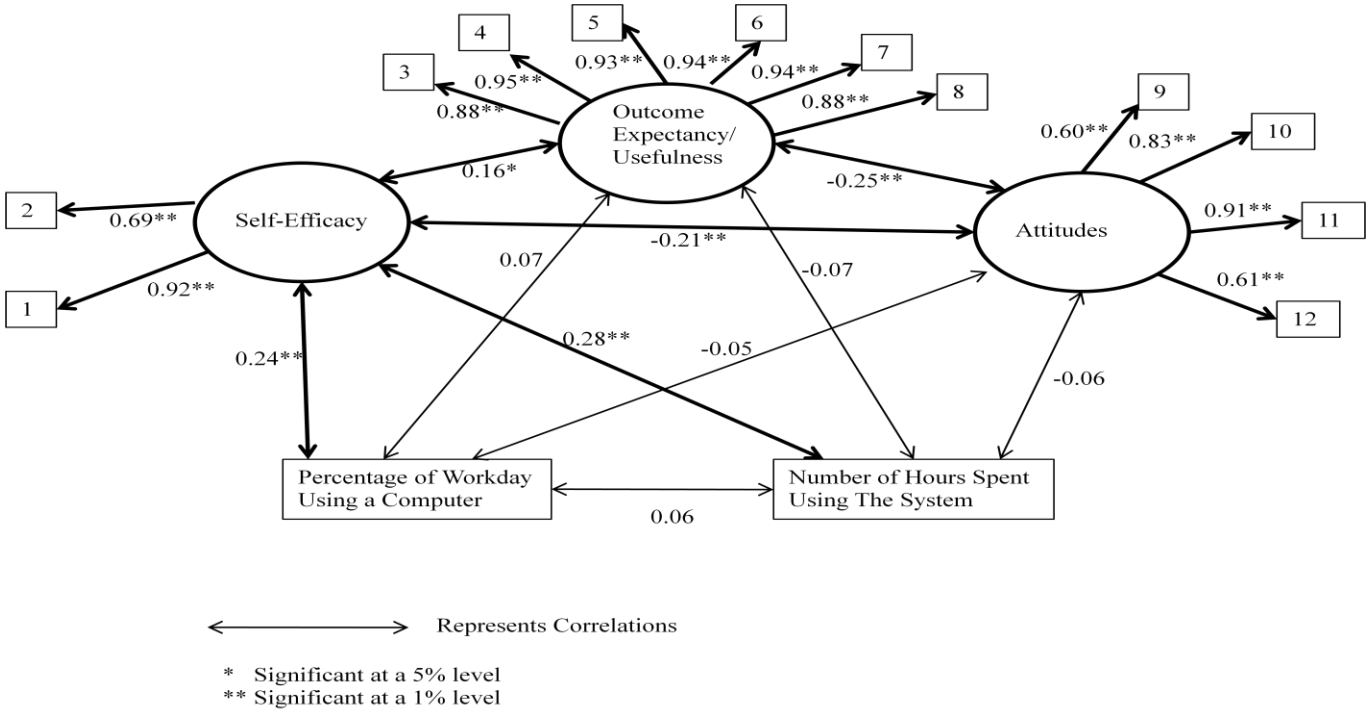
Discriminant validity was examined using the squared correlation between each pair of measures (computed from the correlations estimated in the confirmatory factor analysis) to their average percentage of shared variances. Discriminant validity is satisfied if, for each measure pair, the average percentage of shared variance is greater than the corresponding squared correlation [4]. These squared correlations ranged from 0.04 to 0.06 and are smaller than the corresponding average percentages of shared variances. Thus, discriminant validity was satisfied [4]. Given these convergent and discriminant validity results, it can be argued that construct validity is satisfied [5].

ESTIMATION OF THE MODEL

The model was estimated using structural equations (i.e., Calis in PC SAS version 9.2) and maximum likelihood. The five measures were allowed to pair-wise correlate. The quality of the fit of the model to the data is evaluated by several summary statistics. The goodness of fit index was 0.87 and this index adjusted for degrees of freedom was 0.81. The root mean square residual was 0.06. The chi-square statistic was statistically significant at a 1% level with a value of 148.14 and 69 degrees of freedom. The normed chi-square was 2.15 while Bentler's comparative fit index was 0.95. The incremental fit indexes (Bentler and Bonett's normed and non-normed and Bollen's normed and non-normed) ranged from 0.87 to 0.95. The quality of this fit based on these summary statistics, is acceptable [5].

The estimation results are summarized in Figure 1. All the standardized path coefficients between the measures and their individual indicants were statistically significant at a 1% level. There were ten pair-wise correlations among the variables that were estimated. Four of these correlations were statistically significant at a 1% level. Another correlation was statistically significant at a 5% level. Furthermore, all the significant correlations had the signs expected.

FIGURE 1: ESTIMATED MODEL USING STANDARDIZED PATH COEFFICIENTS



DISCUSSION

As theory predicts, self-efficacy, outcome expectancy/usefulness, and attitudes were found to be pair-wise correlated in a statistically significant manner. Due to the phrasing of the items in the attitude measure, these attitudes were negative (e.g., apprehension, fear, intimidation). As a result, the significant correlations between self-efficacy to attitudes and outcome expectancy/usefulness to attitudes were negative. These results imply that when faculty are more confident in their use of The System, they tend to have less negative attitudes toward this System. Similarly, faculty who view The System as having greater outcome expectancy or usefulness tend to have higher levels of positive attitudes. Furthermore, there was a meaningful, positive relationship between self-efficacy and outcome expectancy/usefulness meaning that faculty with higher levels of confidence in using The System tend to have higher perceptions of the benefits from using The System. The two personal mastery variables of percentage of the workday using a computer and number of hours spent using The System had significant correlations only with self-efficacy. The interpretation of these results are that faculty who spend more time each day working on a computer or spend more time using The System tend to have higher confidence in their ability to use The System. Interestingly, these use variables had no meaningful relationships with attitudes about The System or expected benefits from using The System.

CONCLUSIONS

The results indicate that faculty attitudes are related to their self-efficacy and outcome expectancy/usefulness regarding using The System. Personal mastery variables such as hours faculty

spend working on a computer each day and time spent using The System tend to influence self-efficacy, but no other variables. Within the context of empirical results that make use of correlations, there are a few cautious recommendations to positively influence faculty attitudes toward an activity repository. These recommendations hinge on positively influencing self-efficacy regarding the use of The System. Based on these correlations, this would mean providing faculty experiences in the use of The System, which could likely include training. Furthermore, since a positive correlation between the percentage of the workday using a computer and self-efficacy was found, these experiences and training could be focused on users not spending a significant portion of their workday using a computer.

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