

EXAMINING THE RELATIONSHIP BETWEEN TEACHERS' ATTITUDES AND MOTIVATION TOWARD WEB-BASED PROFESSIONAL DEVELOPMENT: A STRUCTURAL EQUATION MODELING APPROACH

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ABSTRACT

This study was conducted to investigate elementary school teachers' attitudes and motivation toward web-based professional development. The relationship between teachers' attitudes and motivation was explored using the AWPDP (Attitudes toward Web-based Professional Development) and MWPD (Motivation toward Web-based Professional Development) surveys, respectively. The AWPDP consisted of five scales, including "Perceived usefulness", "Perceived ease of use", "Affection", "Anxiety", and "Behavior". The MWPD also consisted of five scales, including "personal interest", "social stimulation", "external expectation", "practical enhancement", and "social contact". Data gathered from 322 elementary school teachers were examined through structural equation modeling. The results indicate that, in general, the teachers' attitudes and their motivation toward web-based professional development were significantly positively correlated with each other. It was also found that teachers with higher motivation have more positive attitudes toward web-based professional development.

Keywords: attitudes, motivation, web-based professional development

INTRODUCTION

In the past decade, the rapid diffusion of the Internet has not only generated a renewed interest in the role of new information and communication technologies (ICTs) in educational contexts, but has also affected the ways people teach and learn (DeLacey & Leonard, 2002). With the rapid development of the Internet, teachers have more opportunities to employ it in their practices, and to advance their professional development (Park, Lee, & Cheong, 2007). Recently, the advantages of web-based learning have been widely recognized and accepted. Research suggests that technology-mediated learning environments afford more study flexibility and broader accessibility, while also improving students' performance (Lee, Cheung, & Chen, 2005).

The relevant studies of learners' acceptance and usage of web-based learning have been highlighted (Liaw, Huang, & Chen, 2007; Kao & Tsai, 2009). The Theory of Reasoned Action (TRA) argues that individuals' beliefs define their attitudes and thereby shape their intentions, which in turn, guide their behavior. Extended from TRA, the Theory of Planned Behavior (TPB) stipulates that individuals' beliefs can be explained by their behavioral intentions, which are jointly influenced by their attitudes, subjective norms, and perceived behavioral control. Further, the Technology Acceptance Model (TAM), which is adapted from TPB, has been widely used to predict user acceptance and usage behavior (Davis, 1989). In TAM, beliefs of individuals determine their attitudes toward using a particular system and, in turn, these attitudes foster their intention to use it. This intention influences the decision of actual technology usage. These causalities have been thoroughly studied and broadly accepted (Suh & Han, 2002). The TAM has shown that motivation formulates the mechanism of human behavior and action.

With the proliferation of the Internet, researchers have modified TAM and demonstrated it empirically in the context of web-based learning (Shin, 2007). Some recent studies have investigated learners' acceptance of web-based learning environments (Lee, Cheung, & Chen, 2005; Raaij & Schepers, 2006). These studies have revealed that teachers' motivation toward web-based professional development may be an important issue for investigation. As such, this study incorporates the motivational perspective to explore and predict teachers' acceptance and usage of web-based learning. Many previous Internet technology-related behavioral studies have

used the belief-attitude-intention-behavior chain represented by the TAM formulation to successfully predict learners' online acceptance behavior (Heijden, 2003; Saadé & Bahli, 2005). In addition, past studies investigating the role of motivation in Internet use have also confirmed that it has a positive impact on new technology adoption and use (e.g., Stafford & Stern, 2002; Vandenbroeck, Verschelden, & Boonaert, 2008). Moreover, instrumental use of media and technology with greater motivation has been found to produce stronger attitudinal and behavioral effects on the use of media and technology (Rubin, 2002). Hence, it is plausible to hypothesize that teachers' motivation toward web-based professional development may affect their attitudes.

In sum, the major purpose of this study was to probe the relationship of teachers' motivation and attitudes toward web-based professional development. To this end, two questionnaires were administered. By gathering questionnaire responses from 322 elementary school teachers in Taiwan, this study aimed to answer the following question: What are the relationships between the teachers' motivation toward web-based professional development and their attitudes toward web-based professional development?

RELATED LITERATURE

In the past decade, a great number of studies have focused on the factors such as beliefs and attitudes that influence learners' usage behaviors regarding information technology and web-based learning (Liaw, Chang, Hung, & Huang, 2006; Kao & Tsai, 2009). In these studies, researchers have mostly paid attention to exploring students and teachers' various characteristics of information technology and web-based learning. However, few studies have focused on constructs related to the web-based professional development of teachers. As a result, the issue of teachers' characteristics in terms of web-based learning should also be highlighted when they have more opportunities to learn and advance their professional development on the Internet.

Attitudes toward web-based learning & professional development

Previous studies have revealed that attitudes toward a new technology play an important role in its acceptance and usage (Davis, Bagozzi, & Warshaw, 1989; Liaw, 2002). Over the past decade, researchers have explored learners' attitudes toward computers, the Internet and web-based learning (Colley & Comber, 2003; Kao & Tsai, 2009; Tsai & Lin, 2004). However, comparatively fewer studies have been conducted to investigate teachers' attitudes toward web-based professional development. Hence, one of the purposes of this study was to assess these attitudes. The literature has shown that the Technology Acceptance Model (TAM), introduced by Davis (1989), has built a powerful model for explaining and predicting users' computer intentions and acceptance. An individual's actual system usage is determined by attitudes and behavioral intentions. In TAM, perceived usefulness and perceived ease of use are hypothesized as being the fundamental determinants of user acceptance (Davis, 1989). Besides, according to Taylor and Todd's (1995) Decomposed Theory of Planned Behavior (Decomposed TPB), attitudes can be decomposed into "perceived usefulness," "perceived ease," and "compatibility".

Motivation toward web-based learning & professional development

Moreover, this study aimed to explore the psychological factors that might be related to the educators' attitudes. One of the factors is motivation, which refers to the process whereby goal-directed activity is instigated and sustained (Schunk, Pintrich, & Meece, 2008). Previous studies have shown that learners' attitudes can be discussed from a motivational perspective (Rubin, 2002; Saadé & Bahli, 2005). Also, some studies have explored and examined various constructs related to web-based learning in educational settings. However, relatively few have focused on educators' motivation and their attitudes toward web-based professional development. Hence, this study aimed to investigate the relationship between the educators' motivation and their attitudes toward web-based professional development.

METHOD

Sample

The participants of this study were randomly drawn from 30 elementary schools in the northern region of Taiwan. The final sample comprised 322 Taiwanese elementary school teachers with actual experience of web-based professional development. Among the participating teachers, 99 (30.7%) were male and the remaining 223 (69.3%) were female. In terms of Internet experience, 160 (49.7%) reported using the Internet less than 12 hours per week, 73 (22.7%) reported 13 to 24 on-line hours per week, and 89 (27.6%) more than 25 hours per week.

Instruments

To assess the teachers' motivation and attitude toward web-based professional development, two instruments were adopted in this study.

The Motivation toward Web-based Professional Development Survey (MWPD) administered in this study was

adapted from Kao, Wu and Tsai's (2011) survey. The items developed in this study were mainly based upon the original items, and the authors consulted with two experts in educational technology and five elementary school teachers with actual experience of web-based professional development. The initial pool of items in the survey included a total of 30 items, which were presented using a seven-point Likert mode (ranging from 1, "strongly disagree" to 7, "strongly agree"). Five scales were designed for the MWPD as follows:

1. *Personal interest scale*: People who score highly on this scale participate in web-based professional development for its own interest. That is, they care about the inherent joy of this form of professional development that impels their participation.
2. *Social stimulation scale*: People who score highly on this scale are usually lonely or bored in regular life or teaching and so participate in web-based professional development to meet others and to grapple with problems in their social life.
3. *External expectation scale*: People who score highly on this scale participate in web-based professional development because of the expectations of someone at work.
4. *Practical enhancement scale*: People who score highly on this scale are committed to "doing good" in education. That is, they think web-based professional development helps them do good work in education.
5. *Social contact scale*: People who score highly on this scale participate in web-based professional development because of the joy of interacting with others.

The Attitudes toward Web-based Professional Development Survey (AWPD) implemented in this study was adapted from Kao and Tsai's (2009) survey. The 27 items were also presented with a seven-point Likert scale (from 1, "strongly disagree" to 7, "strongly agree"). The details of the five scales are as follows:

1. *Perceived usefulness scale*: assessing perceptions of the extent to which teachers perceive that the impact of web-based professional development is positive and useful. The higher the scores, the stronger the attitudes toward the usefulness of web-based professional development.
2. *Perceived ease of use scale*: assessing perceptions of the extent to which teachers perceive that web-based professional development is easy to attain.
3. *Affection scale*: measuring perceptions of the extent to which teachers express favorable feelings about web-based professional development. Higher scores suggest more positive feelings about web-based professional development.
4. *Anxiety scale*: measuring perceptions of the extent to which teachers experience anxiety about web-based professional development. The scale score is scored in reverse. Thus, higher scores indicate less anxiety about web-based professional development.
5. *Behavior scale*: measuring perceptions of the extent to which teachers perceive actual practice and willingness to use web-based professional development. The higher the scores, the stronger willingness to use web-based professional development.

RESULTS

Instrument validation

To validate the MWPD, both exploratory factor analyses (EFA) and confirmatory factor analyses (CFA) were conducted in the research. In the EFA, the extraction method was performed by principle component analysis, and the rotation method was varimax with Kaiser normalization. The EFA results presented in Table 1 show that the MWPD consisted of 22 items with five scales. The factor loadings for the retained items are also shown in Table 1. The reliability coefficients for the scales respectively were 0.83 (personal interest, 5 items), 0.83 (social stimulation, 5 items), 0.86 (external expectation, 4 items), 0.87 (practical enhancement, 4 items), and 0.86 (social contact, 4 items). The alpha value of the whole MWPD questionnaire was 0.90, and these scales explained 68.08% of variance totally. Therefore, these scales were deemed to be sufficiently reliable for assessing teachers' motivation toward web-based professional development.

In addition, a series of CFA was conducted by LISREL in order to re-confirm the validity and reliability of the MWPD. The fitness of items for each scale of the MWPD was examined and the results are presented in Table 1. As shown in Table 1, all the t-values of the 22 items on the five scales of the MWPD exhibited statistical significance at the 0.001 level. Further, the factor loadings of all the items were higher than 0.5, indicating that all of those items within each scale were highly correlated with each other and, therefore, revealed convergent validity. The reliability of the MWPD was evaluated again by assessing the composite reliability coefficient of each scale. Table 1 shows that all of the composite reliability coefficients were larger than 0.70, indicating adequate levels of reliability for the constructs. In sum, the results in Table 1 show high validity and reliability of the MWPD instrument.

Similar to the MWPD validation, the fitness of the items for each scale of the AWPDP was examined and the results are presented in Table 2. The AWPDP consisted of 22 items on the five scales. As Table 2 shows, the reliability coefficients for the scales respectively were 0.91 (perceived usefulness, 6 items), 0.88 (perceived ease of use, 6 items), 0.84 (affection, 3 items), 0.88 (anxiety, 3 items), and 0.85 (behavior, 4 items). The alpha value of the whole AWPDP questionnaire was 0.91 and these factors explained 72.93% of variance totally. Therefore, these scales were deemed to be sufficiently reliable for assessing teachers' attitudes toward web-based professional development.

Table 1: A summary of the EFA and CFA results for the MWPD (n=322)

Scale	Item	M	SD	EFA (Exploratory factor analyses)				CFA (Confirmatory factor analyses)		
				FL ^a	EV ^b	VE ^c	C ^d	FL ^a	t-value	CR ^e
Personal interest	PI1	5.91	0.73	0.70	3.25	14.13%	0.83	.63	Fixed-item	0.84
	PI2	5.98	0.66	0.82				.78	10.90***	
	PI3	6.00	0.67	0.74				.83	11.36***	
	PI4	5.89	0.73	0.76				.75	10.63***	
	PI5	6.04	0.69	0.70				.55	8.43***	
Social stimulation	SS1	5.29	1.07	0.77	3.23	14.02%	0.83	.84	Fixed-item	0.75
	SS2	5.35	1.30	0.81				.86	17.53***	
	SS3	5.89	0.94	0.57				.51	9.27***	
	SS4	5.12	1.29	0.76				.72	14.08***	
	SS5	4.61	1.56	0.65				.64	12.14***	
External expectation	EE1	4.38	1.44	0.85	3.05	13.25%	0.86	.82	Fixed-item	0.80
	EE2	4.60	1.34	0.91				.92	18.27***	
	EE3	4.81	1.17	0.66				.61	11.33***	
	EE4	4.42	1.32	0.85				.78	15.62***	
Practical enhancement	PE1	5.42	1.02	0.73	3.21	13.96%	0.87	.78	Fixed-item	0.83
	PE2	5.55	0.97	0.82				.87	8.48***	
	PE3	5.56	1.01	0.86				.89	8.52***	
	PE4	5.84	0.85	0.72				.82	8.32***	
Social contact	SC1	5.58	0.96	0.78	2.92	12.71%	0.86	.81	Fixed-item	0.80
	SC2	5.69	0.86	0.80				.81	15.46***	
	SC3	5.62	0.96	0.74				.80	15.31***	
	SC4	5.72	0.87	0.74				.72	13.47***	

Overall $\alpha = 0.90$, total variance explained is 68.08%

*** $p < 0.001$

^a Factor Loading

^b Eigen-value

^c Variance Explained

^d Cronbach α

^e Composite Reliability

Moreover, in the CFA, the fitness of items for each scale of the AWPDP was examined. The results are presented in Table 2, which shows that all the t-values of the 22 items on the five scales of the AWPDP exhibited statistical significance at the 0.001 level. Further, the factor loadings of all the items were higher than 0.6, indicating that all of those items within each scale were highly correlated with each other and, therefore, revealed convergent validity. In addition, at the construct level the composite reliability coefficient of each scale shown in Table 2 was larger than 0.70, indicating adequate levels of reliability. In sum, the results in Table 2 show the high validity and reliability of the AWPDP instrument.

Table 2: A summary of the EFA and CFA results for the AWPDP (n=322)

Scale	Item	M	SD	EFA (Exploratory factor analyses)				CFA (Confirmatory factor analyses)		
				FL ^a	EV ^b	VE ^c	C ^d	FL ^a	t-value	CR ^e
Perceived usefulness	PU1	5.93	0.82	0.78	4.20	19.10%	0.91	.79	Fixed-item	0.85
	PU2	5.90	0.83	0.83				.78	15.34***	
	PU3	5.86	0.91	0.82				.79	15.37***	
	PU4	5.78	0.81	0.71				.80	14.94***	

	PU5	5.80	0.90	0.72				.82	15.13 ^{***}	
	PU6	5.92	0.75	0.69				.73	13.46 ^{***}	
Perceived ease of use	EU1	5.72	0.92	0.62	3.84	17.45%	0.88	.72	Fixed-item	0.81
	EU2	5.85	0.87	0.76				.81	14.03 ^{***}	
	EU3	5.75	0.89	0.66				.79	13.38 ^{***}	
	EU4	5.68	0.97	0.65				.73	12.05 ^{***}	
	EU5	5.40	0.96	0.73				.72	11.78 ^{***}	
	EU6	5.75	0.89	0.73				.72	12.03 ^{***}	
Affection	Af1	5.70	0.81	0.71	2.33	10.58%	0.84	.89	Fixed-item	0.78
	Af2	5.63	0.96	0.83				.79	16.57 ^{***}	
	Af3	5.69	0.74	0.57				.74	13.98 ^{***}	
Anxiety	An1	4.65	1.52	0.90	2.64	11.99%	0.88	.92	Fixed-item	0.85
	An2	4.89	1.41	0.91				.90	20.02 ^{***}	
	An3	4.75	1.46	0.83				.73	15.40 ^{***}	
Behavior	B1	4.36	1.39	0.70	3.04	13.82%	0.85	.64	Fixed-item	0.80
	B2	4.86	1.23	0.80				.75	11.51 ^{***}	
	B3	5.41	1.04	0.78				.87	11.81 ^{***}	
	B4	5.31	1.01	0.82				.86	11.83 ^{***}	

Overall $\alpha=0.91$, total variance explained is 72.93%

^{***} $p < 0.001$

^a Factor Loading

^b Eigen-value

^c Variance Explained

^d Cronbach α

^e Composite Reliability

Structure model

By performing SEM with LISREL, the relationship between the MWPD and AWPD was explored to test how well the proposed model reproduces the observed data (Hair et al., 2006). The five scales of the MWPD were used as the predictor variables, while the five scales of the AWPD were used as the outcome variables for the analysis. Overall structural model fit was assessed with various measures (Bentler, 1995; Sorbom & Joreskog, 1982). Kelloway (1998) has suggested that the use of a chi-square test is reasonable when the study involves a large sample. However, as the chi-square is very sensitive to sample size, the degree of freedom can be used as an adjusting standard by which to judge whether chi-square is large or small (Joreskog & Sorbom, 1989). Therefore, in this study, the chi-square per degree of freedom was used. Other types of goodness-of-fit measures include root mean squared error of approximation (RMSEA), root mean square residual (RMR), goodness of fit index (GFI), adjusted goodness of fit index (AGFI), normed fit index (NFI), the comparative fit index (CFI), and incremental fit index (IFI). Each of the fits of the structural model and the recommended values of the fit index are shown in Table 3. The χ^2/DF ratio of the model was 2.99, suggesting a fairly good fit. Moreover, the model in Table 3 shows an RMSEA of 0.07 and an RMR of 0.04, and the GFI, AGFI, NFI, CFI, and IFI values are all over 0.90, indicating that the model has a highly satisfactory fit.

Table 3: Fit measures for the structural model

Fit index	Structural model	Recommended value
χ^2/DF	2.99	≤ 5
Root Mean Square Error of Approximation (RMSEA)	0.07	< 0.08
Root Mean Square Residual (RMR)	0.04	< 0.05
Goodness-of-Fit Index (GFI)	0.94	> 0.90
Adjusted Goodness-of-Fit Index (AGFI)	0.91	> 0.90
Normed Fit Index (NFI)	0.90	> 0.90
Comparative Fit Index (CFI)	0.93	> 0.90
Incremental Fit Index (IFI)	0.93	> 0.90

The structural model was estimated using the maximum likelihood method. Table 4 provides a summary of the parameter estimates (completed standard coefficients) and the t -values for the model. The results in Table 4 indicate that the MWPD partially affected the AWPD. In particular, 'personal interest' had significant positive effects on 'perceived usefulness', 'perceived ease of use', 'affection', and 'anxiety' but not 'behavior'. Moreover, it was found that 'social stimulation' had statistically positive effects on 'perceived usefulness' and 'behavior', while 'practical enhancement' had a positive effect on 'perceived usefulness'. It is noted that 'social

contact’ had a statistically positive effect on ‘affection’ and ‘behavior’. However, ‘external expectation’ had a slightly negative effect on ‘anxiety’.

Table 4: SEM results for the relationship between MWPD and AWPD

Parameter estimates for the structural model		
Model 3	Parameter estimates	t-value
Personal interest → Perceived usefulness	0.22***	3.98
Personal interest → Perceived ease of use	0.19***	3.32
Personal interest → Affection	0.21***	3.86
Personal interest → Anxiety	0.29***	4.86
Personal interest → Behavior	0.09	1.59
Social stimulation → Perceived usefulness	0.15*	2.43
Social stimulation → Perceived ease of use	0.12	1.91
Social stimulation → Affection	0.06	0.93
Social stimulation → Anxiety	-0.12	-1.78
Social stimulation → Behavior	0.14*	2.30
External expectation → Perceived usefulness	0.00	0.08
External expectation → Perceived ease of use	0.06	1.09
External expectation → Affection	-0.09	-1.58
External expectation → Anxiety	-0.13*	-2.23
External expectation → Behavior	0.01	0.11
Practical enhancement → Perceived usefulness	0.14*	2.14
Practical enhancement → Perceived ease of use	0.07	0.98
Practical enhancement → Affection	0.13	1.88
Practical enhancement → Anxiety	0.05	0.72
Practical enhancement → Behavior	0.10	1.46
Social contact → Perceived usefulness	0.09	1.36
Social contact → Perceived ease of use	0.12	1.75
Social contact → Affection	0.19**	2.98
Social contact → Anxiety	0.05	0.70
Social contact → Behavior	0.27***	4.25

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

DISCUSSION AND CONCLUSIONS

This research set out to explore the relationship between teachers’ motivation and attitudes toward web-based professional development. To this end, two questionnaires to assess teachers’ motivation toward web-based professional development (i.e., the MWPD) and attitudes toward web-based professional development (i.e., the AWPD) were used in this study. Employing structural equation modeling, the results showed that the MWPD and AWPD implemented in this study were sufficiently reliable to assess elementary school teachers’ motivation and attitudes toward web-based professional development. Mostly, the findings demonstrate the pivotal role that teachers’ motivation toward web-based professional development can play to improve their attitudes. Specifically, the different motivations toward web-based professional development impact differently on their attitudes. Personal interest is shown to enhance attitudes toward web-based professional development, such as perceived usefulness, perceived ease of use, affection, and less anxiety. In other words, teachers with stronger personal interest would express more useful, favorable, comfortable and easier perceptions, and in turn are more willing to engage in web-based professional development.

There are several findings bearing practical implications for enhancing educators’ attitudes toward web-based learning and helping them to leverage technology in their personal development. First, we found that teachers experiencing stronger social stimulation would tend to perceive web-based professional development as being more useful. Second, teachers with more social contact tend to have favorable feelings about and willingness to use web-based professional development. Third, teachers with stronger practical enhancement motives are likely to have increased perceptions of the usefulness of web-based learning. Lastly, it is worth noting that teachers experiencing higher external expectations tend to have negative attitudes toward web-based professional development.

This study attests to and contributes to the theories of TAM and decomposed TPB by reaffirming the logical path connecting teachers’ motivation and attitudes toward web-based professional development. By and large, teachers with stronger motivation express more positive attitudes and have better perceptions, less anxiety and frequent usage of web-based learning and technology for professional development. This suggests that, to

heighten teachers' attitudes toward web-based professional development, their motivation should be stressed beforehand. In particular, policy makers as well as educators should take measures to induce teachers' personal interest, and provide them with opportunities of social stimulation and practical enhancement, so as to improve their perception of the usefulness of web-based professional development.

In addition, according to prior research demonstrating the positive effects of training programs on learners' beliefs regarding the Internet (e.g., Lagana, 2008; Markauskaite, 2007), our findings suggest that educators should heed the need for effective learning programs and create suitable learning environments to improve teachers' Internet-related capabilities and learning confidence in web-based environments. It may be practicable to enhance teachers' motivation toward web-based professional development by utilizing useful training programs. This study contributes to the understanding of teachers' motivation and attitudes toward web-based professional development. By using the MWPD and AWPD questionnaires, educators and researchers can assess and review teachers' motivation and attitudes toward web-based professional development in a discriminatory way, with possibly higher validity. To complement this research, longitudinal studies are encouraged to unfold thoroughly the contextual ingredients concerning teachers' motivation and attitudes. Further research is encouraged to conduct follow-up studies for different school levels as well as various areas (such as urban or rural) to acquire a better understanding of the possible variations in the teachers' demographics in determining their web-based professional development. More studies on the interplay between teachers' self-efficacy, motivation, attitudes, and use intention in web-based professional development contexts are necessary to support the findings of this study. In sum, this study provides some innovative thoughts about elementary school teachers' motivation and attitudes toward web-based professional development, and the practical importance of the results is noted in that they can help policy makers understand teachers' perceptions and behaviors and adjust their professional development policies accordingly.

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