Elementary school teachers' motivation toward web-based professional development, and the relationship with Internet self-efficacy and belief about web-based learning

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ABSTRACT

This study was conducted to explore the relationships between teachers' motivation toward web-based professional development, Internet self-efficacy, and beliefs about web-based learning. By gathering questionnaire data from 484 elementary school teachers, this study indicated that the teachers' Internet self-efficacy and behavioral beliefs about web-based learning were significant predictors for their motivation toward web-based professional development. The teachers with higher Internet self-efficacy and stronger beliefs about the positive consequences of web-based learning tended to express higher motivation toward web-based professional development.

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1. Introduction

"Motivation" refers to the process whereby goal-directed activity is instigated and sustained (Schunk, Pintrich, & Meece, 2008). In the past, the role of an individual's motivation in his/her learning has been highlighted by many educators and researchers (e.g., Kauffman, 2004; Rau, Gao, & Wu, 2008). Previous studies conducted in conventional learning contexts have revealed that motivation plays an important role in learning (e.g., Coleman, Galaczi, & Astruc, 2007; Pintrich, 2004). In particular, it has been revealed that motivation has a reciprocal relationship with learning and performance; that is, motivation influences learning and performance, while on the other hand, what learners do and learn also influences their motivation (Morris, Finnegan, & Wu, 2005; Pintrich, 2003; Schunk et al., 2008). Over the past decade, most of the educational research regarding motivation has focused on student motivation in conventional educational contexts (Boshier,

1977; Braten & Olaussen, 2000; Pintrich, 2003). Recently, with the broad implementation of Internet-based learning, some pioneering studies have also focused on how learners' motivation is related to their learning outcomes and learning experience in Internet-based learning environments (Artino, 2008; Saadé, He, & Kira, 2007). Similar to the important role of student motivation in their Internet-based learning, teachers' motivation may also play a significant role in their web-based professional development. In other words, teachers' motivation toward web-based professional development (i.e., Internet-based learning) is an important issue for investigation. However, still little research addresses this issue. Therefore, this study aims to investigate elementary school teachers' motivation toward web-based professional development.

For teachers, their professional development is crucial for the improvement of their teaching practice. Loughran (2007) has proposed that teachers should view themselves as learners in their professional development. In the conventional context, many teacher professional development programs are not in high quality, offering intellectually superficial seminars (Borko, 2004). In addition, these programs are unable to provide ongoing support for teachers as they attempt to implement new curricula or pedagogies (Barnett, 2002). As a result, teachers often become frustrated with professional development because it is unsuccessful or requires large investments of time they do not have. Currently, there are many initiatives in online teacher professional development

serving large numbers of educators. Moreover, these professional development programs are available to teachers at their convenience and can provide just-in-time assistance (Dede, Ketelhut, Whitehouse, Breit, & McCloskey, 2006). Many teachers are gradually getting to realize the potential benefits of online communities of practice and web-based professional development. Therefore, researchers should concern the issue about teachers' perceptions toward web-based professional development when they have begun to have more opportunities to learn and advance their professional development on the Internet. However, studies about the nature of teachers' web-based learning have not kept pace with its usage. Kao and Tsai (2009) state that teachers' Internet self-efficacy and beliefs about web-based learning were important predictors of their attitudes toward web-based professional development. Thus, teachers' perceptions toward web-based professional development could be studied from various perspectives, such as self-efficacy, belief, and motivation.

In addition, what the important factors are that influence teachers' motivation toward web-based professional development may be another essential research issue. "Self-efficacy" refers to an individual's beliefs in and expectations of his/her capability to perform a task (Bandura, 1996). In motivation research paradigms, it has been revealed that an individual's motivation is influenced by his/her self-efficacy in conventional learning contexts (Fives & Buehl, 2008; Schunk et al., 2008; Spinath & Spinath, 2005; Yang, Tsai, Kim, Cho, & Laffey, 2006). Recently, learners' "Internet self-efficacy", which refers to their self-perceived confidence in and expectations of using the Internet, has been highlighted (e.g., Huang & Liaw, 2007; Wu & Tsai, 2006). Similar to the findings derived from the aforementioned research conducted in conventional learning environments, it is plausible to hypothesize that teachers' Internet self-efficacy may affect their motivation toward web-based professional development. To examine this perspective, this study examines the relationship between teachers' Internet self-efficacy and motivation toward web-based professional development.

Among relevant studies, learners' beliefs are important to their learning experience and successful web-based learning (e.g., Fives & Buehl, 2008; Kollias, Mamalougos, Vamvakoussi, Lakkala, & Vosniadou, 2005). Also, the relevant literature shows that learners' beliefs can be discussed from a motivational perspective (Yang & Tsai, 2008). Extending from this perspective, Ajzen (2002) proposed the theory of planned behavior (TPB) which refers to learners beliefs being related to individuals' learning behavioral intentions. In some studies, teachers' beliefs have been identified as an important variable that is related to their intention to use technology (Bhattacherjee & Premkumar, 2004; Russell, Bebell, O'Dwyer, & O'Connor, 2003). More recently, Kao and Tsai (2009) have investigated a group of elementary school teachers' beliefs about web-based learning; they found that belief about web-based learning is very important for their intentions toward web-based professional development. However, further explorations of the relationship between teachers' motivation toward web-based professional development and beliefs about web-based learning are still rare. Thus, this is further motivation for this study.

In sum, the major purpose of this study is to probe teachers' motivation toward web-based professional development. To this end, a new questionnaire for assessing their motivation is developed in this study. In addition, teachers' Internet self-efficacy as well as their beliefs about web-based learning are also examined. Then, the possibility of using teachers' Internet self-efficacy and their beliefs about web-based learning to predict their motivation toward web-based professional development is examined. By gathering questionnaire responses from 484 elementary school teachers in Taiwan, this study addresses the following questions:

1. What motivation toward web-based professional development do the elementary school teachers have?
2. Do the teachers' background characteristics, such as gender, age and Internet experience, make any difference to their motivation toward web-based professional development?
3. What are the relationships between the teachers' Internet self-efficacy and their motivation toward web-based professional development?
4. What are the relationships between the teachers' beliefs about web-based learning and their motivation toward web-based professional development?
5. Through regression analysis, can the teachers' Internet self-efficacy and beliefs about web-based learning be used to make significant predictions about their motivation toward web-based professional development?

2. Method

2.1. Sample

The participants of this study were randomly selected from 30 elementary schools in the north of Taiwan. The final sample included 484 Taiwanese elementary school teachers of which 151 (31.2%) were male and the remaining 333 (68.8%) were female. Among these teachers, 109 (22.5%) were 30-years-old or younger, 217 (44.8%) were 31–40 years-old, 158 (32.7%) were 41-years-old or older. These teachers also had different amounts of Internet experience, with 174 (36%) spending 6 h or less per week online, 187 (38.6%) spending 7–18 h, and 123 (25.4%) more than 18 h per week. Although this sample could not be viewed as a national sample, the surveyed teachers came from a variety of elementary schools in Taiwan, across different demographic areas and with different backgrounds. Based on the percentages of the population distributions of the elementary school teachers in all city/county districts of Taiwan (Ministry of Education [MOE], 2008), a total of 484 teachers in 30 elementary schools were randomly selected as the subjects of this study. The sample can be viewed as fairly representative due to the following reasons. First, the 484 subjects included 151 male (31.2%) and 333 (68.8%) female teachers, which is very close to the gender distribution (31.75% males vs. 68.15% females) of the elementary school teachers in Taiwan for the school year of 2008. Therefore, the sample is representative in gender. Secondly, the sample used in this study is representative in age distribution. For example, within the 484 valid samples for data analysis, the majority of them came from the age group of 31–40 years-old (44.8%), close to the age distribution percentage for elementary school teachers (43.6%) provided by the Ministry of Education in Taiwan (MOE, 2008). Based on the above results, the data obtained in this study, to a certain extent, were considered as representative for the purpose of data analysis.

2.2. Instruments

To assess the teachers' motivation toward web-based professional development, Internet self-efficacy and beliefs about web-based learning, three instruments were implemented in this study.

To fully explore the perspectives of the teachers' motivation toward web-based professional development, the researchers defined teachers' motivation as intrinsic motivation and extrinsic motivation and adapted from Educational Participation Scale (EPS) proposed by Boshier (1991), suggesting a seven-factor structure of participants' motivation: cognitive interest in a particular subject, communication improvement, social contact, educational preparation, professional advancement, family togetherness, and social

stimulation. EPS is the well known and widely used motivation questionnaire for adults' learning in the educational contexts. Liang and Wu (2010) used a similar framework to survey nurses' motivation toward web-based continuing learning. For this study, we integrate elementary school teachers' working contexts and web-based learning environments into a revised framework of the EPS after consulting with two experts in educational technology to make sure that the items could be specific to web-based professional development for elementary school teachers. By the process of such modification, the Motivation toward Web-based Professional Development Survey (MWPD) was developed in this study.

The MWPD classifies the features of motivation toward web-based professional development into the following six factors: personal interest, occupational promotion, external expectations, practical enhancement, social contact, and social stimulation. Six elementary school teachers were selected to clarify the wording of each item. The initial pool of items in the survey included a total of 36 items, which were presented using a seven-point Likert scale (ranging from 1, "strongly disagree" to 7, "strongly agree"). Six scales were designed for the MWPD. The details of the six scales are as follows:

1. Personal interest: people who score highly on this scale participate in web-based professional development for their own interest. That is, they care about the inherent joy of web-based professional development that impels their participation. A sample item of this scale is "I learn for the joy of it while participating in web-based professional development".
2. Occupational promotion: people who score highly on this scale participate in web-based professional development mainly for the purpose of maintaining their current job or getting a new job. That is, web-based professional development is a way to advance professionally. A sample item of this scale is "I participate in web-based professional development for getting a better job".
3. External expectations: people who score highly on this scale participate in web-based professional development because of the expectations from someone at work. A sample item of this scale is "I participate in web-based professional development due to colleagues' encouragement".
4. Practical enhancement: 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. A sample item of this scale is "I participate in web-based professional development to help me acquire better instructional methods for my students".
5. Social contact: people who score highly on this scale participate in web-based professional development because of the joy of interacting with others. A sample item of this scale is "I participate in web-based professional development to make more friends with the same interest".
6. Social stimulation: people who score highly on this scale are usually lonely or bored in regular life or teaching and they participate in web-based professional development to meet others and to grapple with the problems in their social life. A sample item of this scale is "I participate in web-based professional development to take a break from my routine".

In the study, the construct of Internet self-efficacy was based on Wu and Tsai (2006), which defines a two-factor structure of university students' self-efficacy regarding the Internet: general self-efficacy (such as browsing) and communicative self-efficacy (such as online chatting). Kao and Tsai (2009) integrated elementary school teachers' learning characteristics into Wu and Tsai's framework and defined teachers' Internet self-efficacy: basic self-

efficacy and advanced self-efficacy. Hence, the second instrument of this study, the Internet Self-efficacy Survey (ISS), was derived from Kao and Tsai's (2009) research.

They proposed two factors of Internet self-efficacy, including a total of 16 items presented with bipolar strongly confident/strongly unconfident statements on a seven-point Likert scale. The details of the two scales are as follows:

1. Basic self-efficacy scale: assessing teachers' perceived confidence of utilizing the Internet at a fundamental level. such as using Internet-related tools. That is, the higher the scores, the better basic self-efficacy toward the Internet.
2. Advanced self-efficacy scale: exploring teachers' perceived confidence and self-evaluation toward advanced utilization of the Internet. In other words, the higher the score, the more perceived confidence the user has in advanced usage of the Internet.

In the study, the construct of beliefs about web-based learning were organized based on the theory of planned behavior (TPB) proposed by Ajzen (2002), which specifies that learning behaviors are mediated by beliefs about learning consequences, control factors and social norms. Additionally, Yang and Tsai (2008) integrated the epistemological beliefs into Ajzen's framework and defined a three factor structure of the belief about web-based learning: behavioral belief, contextual belief and perceived difficulty. By this framework, Kao and Tsai (2009) further explored the relationship between teachers' beliefs about web-based learning

Table 1
Rotated factor loadings for MWPD scales.

Scale	Factor coefficients				
Factor 1: External expectations					
Expectation 1	0.820				
Expectation 2	0.821				
Expectation 3	0.611				
Expectation 4	0.852				
Expectation 5	0.682				
Expectation 6	0.682				
Factor 2: Personal interest					
Personal 1		0.804			
Personal 2		0.896			
Personal 3		0.674			
Personal 4		0.847			
Personal 5		0.832			
Factor 3: Social contact					
Social 1			0.771		
Social 2			0.814		
Social 3			0.767		
Social 4			0.649		
Social 5			0.666		
Factor 4: Practical enhancement					
Practical 1				0.558	
Practical 2				0.613	
Practical 3				0.837	
Practical 4				0.770	
Practical 5				0.795	
Factor 5: Occupational promotion					
Occupational 1					0.780
Occupational 2					0.689
Occupational 3					0.859
Occupational 4					0.668
Factor 6: Social Stimulation					
Stimulation 1					0.696
Stimulation 2					0.782
Stimulation 3					0.678
Stimulation 4					0.617

and their attitude toward web-based professional development. Hence, the third instrument of this study, the Beliefs about Web-based Learning Survey (BWL), was derived from Kao and Tsai's (2009) research. They proposed three scales for beliefs about web-based learning, with a total of 22 items. The 22 items were presented using a seven-point Likert scale (from 1, "strongly disagree" to 7, "strongly agree"). The details of the three scales are as follows:

1. Behavioral beliefs scale: assessing the perceptions of the extent to which teachers perceive expected behaviors and the potentially favorable outcomes of web-based learning. Principally, the higher the score, the better the anticipated outcomes of web-based learning.
2. Contextual beliefs scale: investigating the agreement toward the belief that, under certain conditions or for teachers with particular abilities, the web-based learning would be more helpful. In other words, the higher the score, the more conditional considerations of web-based instruction.
3. Perceived difficulty scale: exploring the extent to which teachers believe in the idea that web-based learning is difficult and confusing. That is, the higher the score, the more complexity the teacher feels about web-based learning. A sample item of this scale is "It is difficult to evaluate the effectiveness of web-based learning".

It should be acknowledged that all of the questionnaires implemented in this study were developed by using seven-point Likert scales. Preston and Colman (2000) have recommended the use of 7 response categories as being relatively easy to use and preferred by respondents. Also, researchers recommend the use of an odd rather than an even number of response categories to help the respondents to legitimately adopt a neutral position (Cox, 1980). In addition, as for the optimal number of scale points,

Table 2
Rotated factor loadings for ISS scales.

Scale	Factor coefficients
Factor 1: basic self-efficacy	
1. I feel confident of using a Web browser like "Internet" or "Netscape Navigator".	0.715
2. I feel confident of reading the content from the Web.	0.766
3. I feel confident of clicking the hyperlink to connect to another Website.	0.783
4. I feel confident of key-in the Website address to connect to a particular Website.	0.854
5. I feel confident of printing out the content of a Website.	0.721
6. I feel confident of searching information on the Web by using keywords.	0.776
7. I feel confident of copying text on the Web into the WORD software.	0.799
Factor 2: advanced self-efficacy	
1. I feel confident of setting a nickname by myself in an online chatroom.	0.788
2. I feel confident of reading others' messages in chatroom.	0.794
3. I feel confident of providing information or respond to someone else on a BBS (Bulletin Board System).	0.770
4. I feel confident of talking to others one to one in an online chatroom.	0.880
5. I feel confident of purchasing necessaries of the life from the Web.	0.702
6. I feel confident of making the payment by the Web.	0.789
7. I feel confident of playing online games on the Internet.	0.828

Table 3
Rotated factor loadings for BWL scales.

Scale	Factor coefficients
Factor 1: behavioral beliefs	
1. Web-based learning will dominate the future learning.	0.644
2. I prefer web-based learning than the conventional learning.	0.862
3. Web-based learning is beyond the space and time.	0.783
4. The more web-based learning, the better learning outcome.	0.842
5. Web-based learning can be synchronous and can be easy to re-access.	0.684
6. Carrying out the web-based learning for a whole semester should be fine, if the courses are appropriately designed.	0.763
7. Because of the web-based communication, the distance between teachers and classmates can be reduced.	0.840
8. The web-based learning allows me to know more about my own learning styles and competences.	0.724
Factor 2: perceived difficulty	
1. In web-based learning context, teachers can't control students' learning and make necessary actions.	0.664
2. Too many web resources make me feel unfocused.	0.803
3. You can't have a question right away when meeting problems, and may get the wrong answer from the web-based discussion.	0.905
4. It's difficult to evaluate the effectiveness of web-based learning.	0.886
5. Too many web-based learning make my writing and verbal ability getting worst.	0.767
Factor 3: contextual beliefs	
1. Some contents are good for web-based learning while others might be suitable for the traditional form of learning.	0.769
2. The positive thing about web-based learning may be that it is able to provide quick information from out of school sources.	0.851
3. Web-based learning is more effective for the active learners.	0.535

researchers have to take into account the cognitive discriminating ability of the target population (Andrich & Masters, 1988; Krosnick, 1999). From Weng's (2004) suggestion, if the cognitive ability of the participants is close to that of college students, an odd-numbered, 7-point scale should be able to provide consistent and reliable participant responses. Based on the literature above, 1–7 Likert scales with labeled response categories were used to probe the teachers' motivation toward web-based professional development, Internet self-efficacy and beliefs about web-based learning.

2.3. Data analysis

To fulfill the main purposes of this study, factor analysis, correlation, ANOVA, and regression analyses were conducted as the

Table 4
Gender comparisons of the scales of the MWPD survey.

Scale	Male (mean, SD)	Female (mean, SD)	*t* Value
Personal interest	6.08 (0.84)	5.99 (0.69)	1.30 (n.s.)
Occupational promotion	5.44 (1.16)	5.29 (1.14)	1.32 (n.s.)
External expectations	4.64 (1.30)	4.85 (1.25)	−1.70 (n.s.)
Practical enhancement	5.78 (0.92)	5.78 (0.89)	−0.01 (n.s.)
Social contact	5.56 (1.02)	5.37 (1.12)	1.76 (n.s.)
Social stimulation	5.46 (1.32)	5.47 (1.24)	−0.05 (n.s.)

Table 5
Teachers' motivation toward web-based professional development among different age groups.

Age group	Personal interest (mean, SD)	Occupational promotion (mean, SD)	External expectations (mean, SD)	Practical enhancement (mean, SD)	Social contact (mean, SD)	Social stimulation (mean, SD)
(1) 30 years or less	6.06 (0.74)	5.42 (1.02)	5.08 (1.23)	5.80 (0.90)	5.52 (0.96)	5.59 (1.17)
(2) 31–40 years	6.03 (0.71)	5.36 (1.10)	4.69 (1.32)	5.74 (0.93)	5.40 (1.13)	5.38 (1.33)
(3) 41 years or more	5.97 (0.78)	5.25 (1.29)	4.73 (1.19)	5.85 (0.82)	5.42 (1.13)	5.51 (1.22)
F (ANOVA)	0.53 (n.s.)	0.75 (n.s.)	3.83 (n.s.)	0.74 (n.s.)	0.48 (n.s.)	1.11 (n.s.)

n.s.: non-significant.

statistical methods in this study. The factor analysis was utilized to reveal the scales of the instruments on the teachers' MWPD. In addition, this study also gathered teachers' information about gender, age and Internet experience. By t-tests, gender differences on teachers' MWPD were analyzed. Also, the scales were examined via analysis of variance (ANOVA) to analyze age differences and the differences revealed by different levels of Internet experience. Moreover, correlation analysis was utilized to examine the relationship between ISS and MWPD as well as BWL and MWPD. Then, through a stepwise multiple regression analysis, the teachers' Internet self-efficacy and beliefs about web-based learning were viewed as predictors to explain their motivation toward web-based professional development.

3. Results

3.1. Factor analysis

To clarify the structure of the teachers' motivation toward web-based professional development (MWPD), principal component analysis was utilized as the extraction method, with the rotation method of varimax with Kaiser normalization. An item was retained only when it loaded greater than 0.5 on the relevant factor and less than 0.5 on the non-relevant factor. Through the factor analysis, the final version of the MWPD consisted of 29 items in six scales (Please refer to the Appendix 1). The reliability coefficients for the scales respectively were 0.91 (personal interest, 5 items), 0.84 (occupational promotion, 4 items), 0.89 (external expectations, 6 items), 0.90 (practical enhancement, 5 items), 0.91 (social contact, 5 items) and 0.90 (social stimulation, 4 items). The factor loadings for the retained items are shown in Table 1. The alpha value of the whole MWPD questionnaire is 0.94, and these scales explained 75.39% of variance totally. Therefore, these scales were deemed to be sufficiently reliable for assessing teachers' motivations toward web-based professional development.

Similarly, to clarify the structure of the teachers' Internet self-efficacy, the same process of principal component analysis was utilized. As a result, the initial 16 items were reduced to 14 items for two factors: "Basic self-efficacy" and "Advanced self-efficacy". Both scales had seven items. The factor loadings for the items of these two scales are shown in Table 2, and in total, 68.68% variance was explained by these two scales. In addition, the alpha values for these two scales were 0.91 and 0.93, respectively, and for the whole

ISS questionnaire, it was 0.92, indicating that these scales could be considered as adequately reliable for surveying the teachers' Internet self-efficacy.

Using the aforementioned method, the initial 22 items of the beliefs about web-based learning (BWL) were reduced to 16 items grouped into three factors, "behavioral beliefs", "contextual beliefs" and "perceived difficulty". There were, respectively, 8, 3 and 5 items in the three scales of the BWL. The factor loadings for the retained items are shown in Table 3 and, in total, 65.34% variance was explained by these three scales. In addition, the alpha values for the three scales were 0.90, 0.62 and 0.88, and the overall alpha value was 0.86. Therefore, these scales satisfied the statistical requirements and were deemed to be sufficiently reliable for assessing teachers' beliefs about web-based learning.

3.2. Background differences on the MWPD scales

In this study, t-test and ANOVA tests were employed to examine the background differences such as gender, age and Internet experience on the MWPD scales. First, a series of t-tests was performed on the gender differences of teachers' mean scores for the MWPD. Among the variables examined in Table 4, no significant differences were found on the scales of teachers' motivation of participating web-based professional development between the two genders.

Moreover, in order to compare the possible differences derived from age, we categorized the teacher respondents into three major groups: ≤30 years, 31–40 years, and ≥41 years. The ANOVA tests, presented in Table 5, indicated that age did not show any significant differences in teachers' motivation toward web-based professional development. These findings suggest that teachers across different age groups tend to possess statistically similar motivation toward web-based professional development.

Furthermore, the analyses between different Internet experience groups and their MWPD were conducted, with the results presented in Table 6. The amount of the teacher's average online hours per week was defined as his/her Internet experience, and each teacher was categorized into three groups: <6 h, 6–18 h, and >18 h per week.

Table 6 indicates that Internet experience did not show any significant differences for the MWPD scales. In other words, teachers with different Internet experience tended to express

Table 6
Teachers' motivation toward web-based professional development among groups of different Internet experiences.

Internet experience	Personal interest (mean, SD)	Occupational promotion (mean, SD)	External expectations (mean, SD)	Practical enhancement (mean, SD)	Social contact (mean, SD)	Social stimulation (mean, SD)
(1) 6 h or less	6.01 (0.72)	5.30 (1.16)	4.78 (1.20)	5.76 (0.94)	5.28 (1.15)	5.37 (1.33)
(2) 6–18 h	5.94 (0.76)	5.30 (1.13)	4.72 (1.30)	5.76 (0.86)	5.51 (1.06)	5.43 (1.25)
(3) 19 h or more	6.13 (0.71)	5.43 (1.13)	4.89 (1.31)	5.84 (0.88)	5.52 (1.04)	5.66 (1.14)
F (ANOVA)	2.59 (n.s.)	0.57 (n.s.)	0.69 (n.s.)	0.37 (n.s.)	2.38 (n.s.)	2.04 (n.s.)

n.s.: non-significant.

Table 7
Correlation of the teachers' motivation toward web-based professional development, Internet self-efficacy and beliefs about web-based learning.

	Personal interest	Occupational promotion	External expectations	Practical enhancement	Social contact	Social stimulation
Basic self-efficacy	0.23***	0.12**	−0.06	0.12**	0.14**	0.12**
Advanced self-efficacy	0.19***	0.35***	0.11	0.24***	0.34***	0.32***
Behavioral beliefs	0.43***	0.41***	0.46***	0.46***	0.51***	0.57***
Contextual beliefs	0.32***	0.04	0.20***	0.11	0.06	0.07
Perceived difficulty	0.46***	0.05	0.10	0.04	0.00	0.05

$^{**}p < 0.01$, $^{***}p < 0.001$.

statistically similar motivation toward web-based professional development.

3.3. Correlation between motivation toward web-based professional development, Internet self-efficacy and beliefs about web-based learning

The Pearson correlation coefficients shown in Table 7 indicate that the scales of the MWPD and the ISS were significantly positively correlated with each other ($r > 0.12$, $p < 0.01$), except for the result that no statistical correlation was found between ISS and external expectations. These results in general support that teachers expressing higher Internet self-efficacy would display stronger intention to learn for their own interest, for occupational promotion, to enhance their teaching practice, to make more social contact, and to experience social stimulation as a result of web-based professional development. In particular, teachers' responses on the occupational promotion, social contact and social stimulation scales were relatively more highly correlated with those on the advanced self-efficacy scale ($r \geq 0.32$, $p < 0.001$). This implies that higher advanced Internet self-efficacy may help the teachers attain stronger motivation toward web-based professional development, particularly for promoting occupational status and creating social interactions.

Moreover, it was also found that behavioral beliefs had a positive correlation with all scales of the MWPD. These results indicate that the teachers' responses on the behavioral beliefs scale of the BWL were fairly highly correlated with the personal interest ($r = 0.43$, $p < 0.001$), occupational promotion ($r = 0.41$, $p < 0.001$),

external expectations ($r = 0.46$, $p < 0.001$), practical enhancement ($r = 0.46$, $p < 0.001$), social contact ($r = 0.51$, $p < 0.001$), and social stimulation ($r = 0.57$, $p < 0.001$) scales of the MWPD. These results suggest that the teachers expressing stronger beliefs about web-based learning tend to have higher motivation toward web-based professional development. Meanwhile, personal interest seems to be associated with contextual beliefs ($r = 0.32$, $p < 0.001$) and perceived difficulty ($r = 0.46$, $p < 0.001$). So, if the teachers tend to attend web-based professional development for their own interest, they also tend to have more thorough views of web-based learning. For instance, they believe that web-based learning should consider contextual factors, and they perceive some difficulties in actual implementation. However, no statistical correlation was found between contextual beliefs, perceived difficulty and the occupational promotion, external expectations, practical enhancement, social contact and social stimulation scales of the MWPD.

3.4. Stepwise multiple regression estimates for predicting teachers' motivations toward web-based professional development

Stepwise multiple regression analysis was performed to evaluate the predictive effects of the ISS scales and the BWL scales on each scale of the MWPD. That is, for each regression analysis, the ISS and BWL scales were perceived as predictor variables, while each MWPD scale was processed as an outcome variable, as shown in Table 8.

The regression analysis revealed that the perceived difficulty ($t = 9.92$, $p < 0.001$) and behavioral beliefs ($t = 9.22$, $p < 0.001$) and basic self-efficacy ($t = 4.49$, $p < 0.001$) were the significant

Table 8
Stepwise regression model of predicting teachers' motivation toward web-based professional development ($n = 484$).

Dependent variables	Predicting variables	B	S.E.	β	t	R^2
Motivation toward web-based professional development (personal interest)	Perceived difficulty	0.31	0.03	0.38	9.92***	0.37
	Behavioral beliefs	0.24	0.03	0.34	9.22***	
	Basic self-efficacy	0.20	0.04	0.16	4.49***	
	Constant	1.25	0.35		3.62***	
Motivation toward web-based professional development (occupational promotion)	Behavioral beliefs	0.37	0.05	0.34	8.24***	0.23
	Advanced self-efficacy	0.26	0.04	0.32	6.33***	
	Constant	3.08	0.56		5.51***	
Motivation toward web-based professional development (external expectations)	Behavioral beliefs	0.52	0.05	0.43	10.33***	0.21
	Constant	1.11	0.40		2.78**	
Motivation toward web-based professional development (practical enhancement)	Behavioral beliefs	0.36	0.04	0.43	10.28***	0.22
	Advanced self-efficacy	0.25	0.03	0.13	3.14**	
	Constant	3.34	0.22		15.51***	
Motivation toward web-based professional development (social contact)	Behavioral beliefs	0.48	0.04	0.45	11.59***	0.30
	Advanced self-efficacy	0.17	0.03	0.22	5.66***	
	Constant	1.87	0.25		7.50***	
Motivation toward web-based professional development (social stimulation)	Behavioral beliefs	0.62	0.05	0.52	13.63***	0.35
	Advanced self-efficacy	0.17	0.03	0.19	5.06***	
	Constant	1.11	0.28		3.98***	

$^{**}p < 0.01$, $^{***}p < 0.001$.

predictors explaining the personal interest of the MWPD. Totally, these three scales accounted for 37% of variance. This shows that teachers with stronger behavioral beliefs about web-based learning and better basic self-efficacy toward the Internet express higher motivation of personal interest to use web-based professional development. However, it is worth mentioning that the teachers with stronger perceived difficulty about web-based learning also expressed higher motivation of personal interest in using web-based professional development. This result suggested that even for the teachers with perceived difficulty about web-based learning, if they had stronger behavioral beliefs about web-based learning and better basic Internet self-efficacy, they could have higher motivation of personal interest to use web-based professional development.

In addition, behavioral beliefs and advanced self-efficacy were the significantly positive predictors for occupational promotion, practical enhancement, social contact and social stimulation in the MWPD. That is, the teachers who have stronger behavioral beliefs about web-based learning and advanced Internet self-efficacy express higher motivation toward web-based professional development.

In sum, the results in Table 8 highlight the significant role of behavioral beliefs in predicting MWPD, indicating that teachers with more positive behavioral beliefs about web-based learning are more likely to display stronger motivation toward web-based professional development. A belief in the positive consequences of web-based learning is very important for favorable motivation toward web-based professional development. Also, advanced self-efficacy is an important predictor for many of the MWPD scales, such as occupational promotion, practical enhancement, social contact and social stimulation. Thus, the acquisition of behavioral beliefs about web-based learning and advanced Internet self-efficacy are important for enhancing teachers' MWPD.

4. Discussion and conclusion

This study aims to explore elementary teachers' motivation toward web-based professional development. To this end, a questionnaire to assess teachers' motivation toward web-based professional development (i.e., the MWPD) was developed, and the results show that it is sufficiently reliable to assess elementary school teachers' motivation toward web-based professional development. By using the MWPD questionnaire, educators and researchers can assess and review teachers' motivation toward web-based professional development in a more effective way, with possibly higher validity.

Gender and age differences in motivational issues have always been highlighted by researchers (e.g., Chouinard, Karsenti, & Roy, 2007; Meece, Glienke, & Burg, 2006; Steinmayr & Spinath, 2008). Conducted in conventional learning contexts, previous research concerning gender differences in motivation, in general, has shown that male students have higher learning motivation than female students (Corpus & Lepper, 2007; Warburton & Spray, 2008). However, in this study, with the MWPD, no gender difference in teachers' motivation toward web-based professional development was found. It seems that both male and female teachers perceive similar levels of motivation toward web-based professional development. In particular, as revealed by their high scores on the MWPD, both male and female teachers may tend to view their personal interests and the enhancement of teaching practice as the major reasons to participate in web-based professional development. In other words, many of them, both male and female teachers, are driven by their personal desire and the enrichment of instructional practice when participating in web-based professional development.

Besides, this study reveals that the teachers' motivation toward web-based professional development is not significantly different across ages, a result which is consistent with the perspective proposed by Mulenga and Liang (2008) that age has no significant impact on adult learners' motivation for distance education.

The role of Internet experience has often been examined in Internet-related studies (e.g. Liaw, Chang, Hung, & Huang, 2006; Liu & LaRose, 2008). This study has also attempted to investigate the role of teachers' Internet experience in their motivation toward web-based professional development. Many studies (e.g., Durndell & Haag, 2002; Tsai, 2008) have shown that students' Internet experiences are related to their attitudes and behaviors when using the Internet. However, this study reveals different findings when the research shifts the focus of analysis from general perceptions to motivation toward web-based professional development. The results show that teachers with different Internet experience do not show any significant difference in their motivation toward web-based professional development. In other words, teachers' rich Internet experience may not help them develop stronger motivation toward web-based professional development. The finding above is worth noting as it implies that teachers' Internet experience may not be related to their motivation toward web-based professional development. While teachers have more opportunities to use the Internet, their online experiences could be diverse, such as playing games, online shopping, etc. This is likely to reveal that teachers' Internet use may not affect their learning behaviors in the web-based learning environment.

This study also demonstrates that teachers' Internet self-efficacy is positively correlated with their motivation toward web-based professional development. Teachers with higher Internet self-efficacy express greater motivation of personal interest, occupational promotion, practical enhancement, social contact and social stimulation for web-based professional development. A similar finding was revealed by Liang and Wu (2010) for clinical nurses' motivation toward web-based continuing learning. Wood and Bandura (1989) stated that self-efficacy can mobilize the motivation to meet given situational demands, therefore, in the web-based learning context, the greater teachers perceived their Internet self-efficacy to be, the stronger motivation they participate in the web-based professional development.

Also, the correlation analyses indicate that teachers with stronger behavioral beliefs about web-based learning show higher motivational perceptions of web-based professional development. Based on Bandura's (1993) socio-cognitive theory, the outcome expectation plays an important role in motivation. It suggests that teachers who perceive positive consequences of carrying out web-based learning will enhance their motivation to participate in the web-based professional development. This suggests that, to improve teachers' motivation toward web-based professional development, teachers' Internet self-efficacy and their behavioral beliefs about web-based learning should be highlighted.

Furthermore, through stepwise regression analyses, it was found that teachers' behavioral beliefs about web-based learning are the most significant positive predictor for personal interest, occupational promotion, external expectations, practical enhancement, social contact and external stimulation of web-based professional development. That is, teachers' beliefs in the positive outcomes of web-based learning are critical for their motivation toward web-based professional development. According to Bandura's (1997) research, he noted that outcome expectations constitute an important factor to affect motivation. This result echoes the previous findings concerning the influences of an individual's behavioral belief on intention to perform some learning behaviors (Ajzen, 2002; Bhattacherjee, 2001). In addition, some studies have expressed that technology usage was related to

the users' beliefs and learning intentions (Davis, Bagozzi, & Warshaw, 1992; Koslowsky & Hoffman, 1990). Based on these findings, we shift the focus to the web-based learning context, and the result of this study is similar to that revealed by Kao and Tsai (2009), showing that teachers' behavioral beliefs are the key determinants for their behavioral intentions.

Previous studies have indicated that adequate usage of courses and learning tools may foster learners' beliefs about the value of specific technologies by providing them with opportunities to actually learn with these technologies (e.g., Hermans, Tondeur, van Braak, & Valcke, 2008; Saadé et al., 2007). Thus, the results of this study seem to suggest that educators should try to offer some exemplary online courses to help teachers develop more real positive experiences of web-based learning. Then, teachers' motivation toward web-based professional development may be enhanced.

In addition, the regression analysis also revealed that teachers' advanced Internet self-efficacy is also a significant positive predictor for the occupational promotion, practical enhancement, social contact and social stimulation aims of web-based professional development. That is, teachers with higher advanced Internet self-efficacy express stronger motivation to use web-based professional development. The result supported the conclusion by many previous studies (Midgley, Feldlaufer, & Eccles, 1989; Torre Cruz & Casanova Arias, 2007) that when learners increase perceived self-efficacy, their level of motivation toward learning will also be fostered at the same time. Zimmerman (2000) also noted that perceived self-efficacy influences students' motivational processes of learning. These results validate the role that self-efficacy plays in motivating persistence. Nevertheless, the focus of the present study is situated in the web-based context. The result of this study is congruent with Liaw's (2007) research that teachers' self-efficacy is a key determinant for understanding their motivation toward web-based professional development.

Researchers have proposed the positive effects of training programs on learners' self-efficacy regarding the Internet (e.g., Lagana, 2008; Markauskaite, 2007). This study's results seem to suggest that educators should try to find some effective ways to improve teachers' Internet-related capabilities and practice using relevant tools in Internet-based environments. It may be practicable for educators to enhance teachers' Internet self-efficacy by utilizing useful training programs.

According to Bandura (1986), competent teachers with successful learning experiences are the most influential source in the development of learners' beliefs. Exposure to a competent model is vital since individuals are likely to imitate the behavior of those they believe are competent. Also, the findings derived from recent research have suggested that, to be successful in building positive teachers' beliefs about learning, the intervention may include exposure to competent teachers with successful experiences (Siwatu, 2007). This seems to suggest a possible way for promoting teachers' beliefs about web-based learning. Teacher educators can try to ask competent teachers with successful experience of executing the practices of web-based learning to share their experiences regarding web-based professional development, as well as how they advance their professional development in web-based learning environments. Also, belief-building interventions should be integrated into the existing and new professional development programs. Thus, teachers may develop more positive beliefs about web-based professional development, and, then, they may obtain better professional development in web-based learning environments.

With the increasing availability of web-based professional development, research issues regarding web-based professional development should be highlighted by teacher educators. This study is one of the initial attempts to explore the relationship between teachers' self-efficacy and their motivation regarding web-based professional development. Most of the previous studies regarding teachers' motivation and self-efficacy were conducted in conventional educational settings, and have suggested that teachers' motivation is influenced by their self-efficacy (Fives & Buehl, 2008; Schunk et al., 2008). Conducted in web-based educational contexts, this study has revealed that Internet self-efficacy has played a significantly positive role in teachers' motivation toward web-based professional development. The finding above not only concurs with those derived from the previous studies conduced in conventional educational settings, but also provides some initial insights into the nature of teachers' web-based professional development.

Moreover, this study demonstrates the critical role of belief about web-based learning in determining motivation toward web-based professional development. Although previous studies have proved that teachers' beliefs have been identified as an important variable that is related to their intention to use technology (Bhattacherjee & Premkumar, 2004; Russell et al., 2003), still not much research addresses this issue in the web-based environment. In this study, we have extended the relationships between belief and motivation in the context of web-based professional development. And the results show that teachers' beliefs about web-based learning constitute a significantly positive predictor for their motivation toward web-based professional development. The findings may provide a new basis for further research in the field of the motivation toward web-based professional development.

The findings derived from this study may provide some possible directions for further research. For example, our sample only included elementary school teachers. To acquire a better understanding of teachers' motivation toward web-based professional development at different school levels, follow-up investigation is suggested to address this issue with samples at other school levels (such as secondary school or university). Moreover, this study was undertaken using quantitative measures, which may not be sufficient to provide in-depth insights into teachers' motivation toward web-based professional development. Future studies are encouraged to employ qualitative or mixed research approaches to gain a full understanding of teachers' motivation of web-based professional development.

Appendix 1. The questionnaire items on the motivation toward web-based professional development (MWPD) survey (final version)

Personal interest
    I participate in WPD for improving information literacy.
    I participate in WPD for enhancing self-growth.
    I participate in WPD for satisfying my enquiring mind
    I participate in WPD for expanding my mind.
    I learn for the joy of it while participating in WPD.

Occupational promotion
    I participate in WPD for getting better qualifications.
    I participate in WPD for preparing for my job.
    I participate in WPD for getting higher job status.
    I participate in WPD for getting a better job.

External expectations

  I participate in WPD due to colleagues' encouragement.
  I participate in WPD due to the learning culture in school.
  I participate in WPD due to others' participation.
  I participate in WPD due to someone me telling about its advantages.
  I participate in WPD because I know my peers also participate in it.
  I participate in WPD to meet school requirements.

Practical enhancement

  I participate in WPD to adapt to the learning style in the future.
  I participate in WPD to be a good example for students.
  I participate in WPD to increase competence in education.
  I participate in WPD to achieve accountability for education.
  I participate in WPD to do something more for education.

Social contact

  I participate in WPD to meet different people.
  I participate in WPD to learn with other teachers.
  I participate in WPD to make more friends with the same interest.
  I participate in WPD to change my social relationships.
  I participate in WPD to exchange ideas about teaching.

Social stimulation

  I participate in WPD to take a break from my routine.
  I participate in WPD to get relief from boredom.
  I participate in WPD to escape teaching pressure.
  I participate in WPD to fill the emptiness in my life.

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