



# Preschool Teachers' Attitudes toward Internet Applications for Professional Development in Taiwan

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This study focuses on preschool teachers' attitudes toward integrated Internet applications for professional development by a survey in Taiwan. The researcher developed a survey questionnaire consisting of five factors: usefulness, effectiveness, behavioral intention, Internet connection, and professional competence. This study analyzed the survey data from Taiwan's preschool teachers' attitudes through structural equation modeling. The findings show that preschool teachers feel positively toward Internet innovative value to improve their pedagogical practices. Their considerations on usefulness, effectiveness, and behavioral intention using the Internet positively influence their attitudes toward Internet-based professional interactions and abilities. The researcher discussed certain implications of the findings. An enhanced understanding of teacher views toward Internet applications in preschools provides Internet-related implementation and references for innovations and high-quality early childhood professional development.

*Keywords:* internet applications, preschool teachers, professional development, structural equation modeling, Taiwan

## INTRODUCTION

Numerous Internet applications have been employed in educational practices over the past few decades. The innovation and diffusion of Internet applications and related tools or resources provide teachers with the means for enhancing professional skills and achieving network learning (Coklar & Saban, 2015; 2013; Zhu, 2013). They have recently made efforts to use Internet applications as an important pedagogical or administrative tool. The development of professional learning communities has transformed teacher cognition and instructions (Lieberman & Mace, 2010). The virtual and interactive content on the Internet promotes teacher effectiveness compared to traditional classroom teaching and improves teacher professional development by taking advantage of the Internet.

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Internet applications support teacher presentations of knowledge construction and professional interaction (Chai, Chin, Koh, & Tan, 2013; Francis-Poscente & Jacobsen, 2013). Increased Internet opportunities present positive teacher motivation to actively participate in constructing knowledge and engaging with the professional community (Esterhuizen, Blignaut, & Ellis, 2013; Qablan, Mansour, Alshamrani, Aldahmash, & Sabbah, 2015). Teachers within the Internet community have applied the Internet in their personal interactions to respond to and solve their practical problems related to teaching; associated factors such as cooperation and harmony provide teachers with more opportunities to achieve successful results.

The Internet-related using skills and the integration of instructional knowledge and ability have become the important part of the professional development for preschool teachers. They recognize the Internet as the assistant tool to help young children increase their learning interests and academic performance. Preschool teachers employ the Internet-related applications to teach young children to participate more actively in learning activities (Liang, Chai, Koh, Yang, & Tsai, 2013). The collaborative Internet environment provides a complex union of personal communication and interactive community to meet professional needs for preschool teachers.

Preschool teachers can collaborate to develop high-quality instructional skills through the Internet community. They can learn more pedagogical professions to interact with other teachers about innovational instructional practices and professional development for young children, and gain more help from the supporting infrastructure about professional consultants and online feedback mechanism (Downer, Kraft-Sayre, & Pianta, 2009; Pianta, Mashburn, Downer, Hamre, & Justice, 2008). Preschool teachers perform more efficiently Internet-related integrations into instructional practices for young children. Their intentions and willingness of developing Internet literacy construct the positively professional map to advance their Internet-related teaching efficiency to help young children development appropriately.

Internet resources and online feedback assist preschool teachers to engage with the professional community and to solve their instructional problems (Chai, Koh, & Tsai, 2011). Internet-related applications and engaging in online communities benefit preschool teachers in meeting their professional development expectations and in enhancing their pedagogical literacy through the Internet. They have more opportunities and tools in creating Internet-based instructional activities and implementing administrative affairs.

### ***State of the literature***

- Most of Taiwanese preschool teachers ignore the advantages of the Internet-related applications because of their work mainly on caring young children, and resulting in no time or energy using the Internet to access or improve their professional development through the Internet.
- This study has to address these questions by examining teacher attitudes toward professional development through the Internet in usefulness, behavioral intention, professional development, and other related issues.
- In this study, attitudes include usefulness, effectiveness, behavioral intention, Internet connection, and professional competence involved in the considerations of preschool teachers on Internet-assisted pedagogical development.

### ***Contribution of this paper to the literature***

- To assess the attitudes of preschool teachers toward applying the Internet in their professional development, the researcher implemented a Chinese questionnaire in this study.
- The survey data were analyzed through SEM. This study employed a two-stage approach to test the measurement model and structural model of a theoretical model hypothesized by the researcher.
- These results suggest that the attitudes of preschool teachers toward professional development could increase their confidence and behaviors of Internet-based applications. Preschool teachers with positive intentions of Internet usefulness and professional identity employ the Internet to develop their knowledge, abilities, and professional development.

The Internet is no longer strange or fresh tool for preschool teachers. It has become the accustomed tools in their life and instructional practices. Preschool teachers can use the Internet-related innovative integrations into instructions to advance cognitive and social performance for young children. They can operate the Internet-related skills to enhance the convenient and comfortable life, and interact with Internet community teachers of the openness and supportive discussions and dialogues to solve the instructional practices in preschools.

There are many high-tech or Internet-related industries in Taiwan, some preschool teachers have recently made efforts to use Internet applications as an important pedagogical or administrative tool in Taiwan. Their Internet self-efficacy and beliefs are important predictors of their attitudes toward Internet-based professional development (Carril, Sanmamed, & Selles, 2013). But most of them ignore the advantages of the Internet-related applications because of their work mainly on caring young children, and resulting in no time or energy using the Internet to access or improve their professional development through the Internet.

In addition, the literature on Internet innovations and applications in the education field is extensive, and studies exploring the attitudes or intentions of preschool teachers toward professional development through the Internet are scant. Therefore, the researcher addresses these questions by examining teacher attitudes toward professional development through the Internet in usefulness, behavioral intention, professional development, and other related issues.

### **Perceived usefulness on intention to use the Internet**

Most study indicates the Internet is a tool that provides multiple opportunities to promote teacher performance in early childhood practices (Hismanoglu, 2012; Shuker & Terreni, 2013). Studies on the views and intentions of preschool teachers in integrating and using computers in early childhood settings mostly present positive views and intentions related to the level of computer self-efficacy. For preschool teachers, Internet-based applications are not only important agents, but also assistant tools for innovative instructions and effective administration in preschools.

The Internet plays a practical key role in the innovative awareness and professional development of preschool teachers, and influences their attitudes and uses toward Internet-based applications. Teachers express positive attitudes toward integrating information and communications technology in early childhood classrooms (de Vries, 2013). Their positive attitudes toward Internet acceptance are influenced by their understanding of, and experiences with, the advantages of Internet-based applications in preschools. A teacher with higher positive attitude toward Internet self-efficacy clearly shows greater preference for Internet applications for preschool performance and instructional effectiveness. This leads to the following hypothesis:

Hypothesis 1: Usefulness positively affects effectiveness.

Certain studies have indicated that user intentions on perceived usefulness, attitude toward computer use, and computer self-efficacy directly affect teacher technology-acceptance preferences and behaviors (Teo & Noyes, 2011; Turel & Johnson, 2012; Wong, Teo, & Russo, 2013). Significant relationships also exist in teacher beliefs on employing Internet applications and their instructional intentions to use the Internet (Gurcay, Wong, & Chai, 2013; Hung, Hwang, & Huang, 2012). Perceived usefulness is a significant predictor of perceived ease of use and intention to use technology, and appears to be the strongest determinant of behavioral intention (Davis, 1989; Davis, Bagozzi, & Warshaw, 1989).

The Internet-acceptance attitudes of teachers toward intrinsic-use motivation, application preference, and identifying practical advantages positively enhance their employment of Internet-related tools and applications to promote personal

interactions and sharing behaviors (Gu, Zhu, & Guo, 2013; Teo, Ursavas, & Bahcekapili, 2012). This provides a deeper understanding of the behavioral intention to use the Internet is influenced by perceived usefulness, perceived ease of use, and attitudes toward use for preschool teachers. This leads to the following hypothesis:

Hypothesis 2: Usefulness positively affects behavioral intention.

Internet-based supporting behaviors help teachers develop a common understanding of core objectives on implementation outcomes, to support and to achieve desired outcomes to foster organizational effectiveness (Sahin & Adiguzel, 2014). They focus on Internet use as a tool for pedagogy and engaging in the professional cultural environment, supporting school administrators to successfully integrate the Internet into their classrooms, and to present positive Internet-perceived effectiveness and behavioral intentions.

The cognition and attitudes of preschool teachers toward Internet acceptance could be an indicator of educational quality in preschools. Based on considerations of Internet usefulness and its practical value for preschool innovation, teacher behavioral intention is supported by their perceived practical efficiency of Internet-related applications. This leads to the following hypothesis:

Hypothesis 3: Effectiveness positively affects behavioral intention.

### **Internet behavioral intention on professional development**

Educating teachers to integrate the Internet effectively across educational practices is important (Abuhmaid, 2011; Chou, 2011). The relationship between Internet and professional development is often a major concern for researchers interested in teacher abilities and attitudes toward Internet-related pedagogical applications (Anastasiades & Vitalaki, 2011). They can employ the Internet to access instructional and administrative resources to support their professional effectiveness in early childhood education (Garvis, Twigg, & Pendergast, 2011).

Attitudes of preschool teachers toward accountability and excellence depend on their pedagogical competence, professional development, and training (Vrinioti, 2013). The Internet provides teachers with an alternative model for social communication and interaction with professional groups in preschools. Internet-assisted professional development activities for preschool teachers improve their Internet literacy and professional knowledge, and offer teachers access to social interactions to connect with others, to satisfy their practical needs. This leads to the following hypothesis:

Hypothesis 4: Behavioral intention positively affects Internet connection.

Most study findings have shown teacher intention of Internet use to be a factor with substantial influence on teacher interaction and performance in Internet-based professional practices (Sotiriou, Bogner, & Neofotistos, 2011; Thomson & Kaufmann, 2013). Internet-related tools help teachers maintain competence with Internet innovations and provide an opportunity to work collaboratively, while supporting their ongoing professional development.

The access and interaction of Internet teacher-communities enhance reflective thinking of classroom practices and accelerate the professional knowledge of preschool teachers related to reflective practices and collaborative learning. According to these studies, the more positive behavioral intention of using the Internet to design or manage pedagogical practices, the more positive attitudes toward their professional interactions and competence resulting from Internet assistance. This leads to the following hypothesis:

Hypothesis 5: Behavioral intention positively affects professional competence.

Professional identification, knowledge, and performance are assisted by the formation and praxis of Internet communities to solve pedagogical problems (Korkeamaki & Dreher, 2012; Mackey & Evans, 2011; Sotiriou, Bogner, & Neofotistos,

2011). Internet community-assisted teachers advance their abilities in professional support, guidance, inspiration, sharing, and teaching. Professional development activities through the Internet potentially enhance teacher instructional skills, reflective thinking, and authentic practices.

For preschool teachers, Internet applications such as effective professional support and communication help reduce teacher anxiety to address children's problems (Brooks, 2010). The professional cooperation of preschool teachers through Internet-based communities can solve their instructional or administrative practical problems and improve Internet literacy and their professional development. This leads to the following hypothesis:

Hypothesis 6: Internet connection positively affects professional competence.

### Study purposes

Therefore, it is important for preschool teachers to deeply explore their attitudes and behavioral intentions toward applying the Internet in preschool practices in Taiwan and for their professional development. In this study, attitudes include usefulness, effectiveness, behavioral intention, Internet connection, and professional competence involved in the considerations of preschool teachers on Internet-assisted pedagogical development. The research model and study hypotheses are shown in Figure 1.

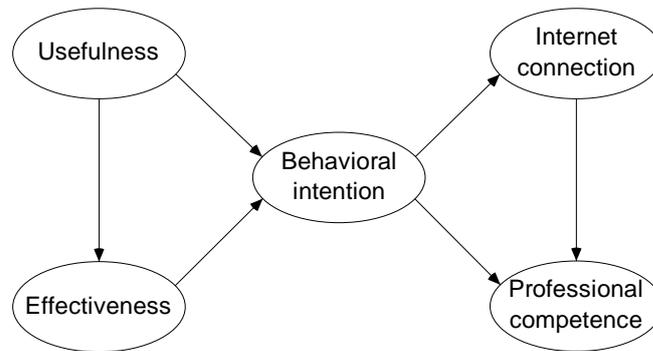


Figure 1. Research model

### METHODS

This study first develops a questionnaire to survey preschool teachers in Taiwan regarding their intentions toward integrating the Internet into their professional development. The researcher then examines the questionnaire survey data by SEM and analyze the questionnaire measurement model and structural model. The relationship between observed variables and latent constructs is tested by CFA. Finally, the researchre further explore the total effects of the hypothesized relationships between latent constructs in the responses.

### Measurement instrument

To assess the attitudes of preschool teachers toward applying the Internet in their professional development, the researcher implemented a Chinese questionnaire, or the Internet Assisted Professional Development Attitude Survey (IAPD), in this study. Based on the literature review and theoretical assumptions of this study, the researcher developed observed variables of the IAPD. After consulting with early childhood education scholars, information technology, and teacher professional development, the researcher assessed and corrected the questionnaire variables.

The researcher proposed the following five latent constructs for Internet-enhanced professional development attitudes and performances: usefulness,

effectiveness, behavioral intention, Internet connection, and professional competence. The original survey instrument included 20 observed variables. Consequently, the IAPD primarily consisted of five latent constructs (three or four variables for each latent construct), presented with bipolar agree/disagree statements on a 5-point Likert scale (1 for most strongly disagree and 5 for most strongly agree). A detailed description of the five latent constructs is presented as follows:

1. Usefulness: assessing attitudes on the extent to which teachers believe Internet applications are useful for their life practices. The latent construct and observed variables for usefulness were based on and derived from Carril, Sanmamed, and Selles (2013), and Teo, and Noyes (2011).

2. Effectiveness: exploring attitudes on the extent to which teachers acknowledge the improvements of pedagogical effectiveness using the Internet. The latent construct and observed variables for usefulness were based on and derived from Turel, and Johnson (2012), Wong, Teo, and Russo (2013).

3. Behavioral intention: investigating the extent of teacher perceptions on the behavioral intention to use Internet in preschools. The latent construct and observed variables for usefulness were based on and derived from Gu, Zhu, and Guo (2013), and Teo, Ursavas, and Bahcekapili (2012).

4. Internet connection: assessing the attitudes on the extent to which teachers employ different models to participate in Internet activities to advance their professional development. The latent construct and observed variables for usefulness were based on and derived from Anastasiades, and Vitalaki (2011), and Garvis, Twigg, and Pendergast (2011).

5. Professional competence: assessing attitudes on the extent to which teachers are competent to improve their professional performance. The latent construct and observed variables for usefulness were based on and derived from Brooks (2010), and Mackey, and Evans (2011).

### **Sample characteristics**

A questionnaire was distributed to preschool teachers working in the mid-northern areas of Taiwan to examine if their positive attitudes and intentions in using the Internet help improve their professional development. According to the parameters of latent constructs and observed variables, 400 questionnaires were distributed. After excluding preschool teachers with certain non-response or missing values, the valid number of anonymous samples was 353, for a response rate of 84%. All respondents were informed about the purposes of this study and the procedures for informed consent, and their privacy and confidentiality needed to be protected. The respondents in this reasonable sample size were composed of teachers with divergent education levels and years of service. Table 1 presents a summary of the sample demographics.

### **Data analysis**

The survey data were analyzed through SEM. The researcher employed a two-stage approach to test the measurement model and structural model of a theoretical model hypothesized by the researcher (Bollen, 1989; Byrne, 2010; Kline, 2010; Schumacker & Lomax, 2010). In the first stage, the measurement model was analyzed using Amos 17.0 with the raw data as the input. CFA of the observed variables to the latent constructs was tested to obtain the reasonable degree of the measurement model. The analyses used maximum likelihood estimation (MLE) to examine related test statistics and model-fit indices. Using the estimations of individual variable-factor loadings, statistical significances, and measurement errors, this procedure focused on the extent to which the sample data supported the hypothesized pattern of

**Table 1.** Sample demographics

<b>Respondent characteristic</b>	<b>Number</b>	<b>Percentage</b>
Gender		
Male	16	4.5
Female	337	95.5
Age		
Under 30	192	54.4
31-40	108	30.6
Over 41	53	15.0
Education level		
High school	28	7.9
University	315	89.2
Graduate school	10	2.8
School type		
Public	59	16.7
Private	294	83.3
Job		
Principle	14	4.0
Director	18	5.1
Teacher	213	60.3
Assistant	108	30.6
Years of service		
Under 5	215	60.9
6-10	88	24.9
11-15	27	7.6
16-20	12	3.4
Over 21	11	3.1
Duration of Internet use		
Under 5	107	30.3
6-10	169	47.9
11-15	53	15.0
16-20	20	5.7
Over 21	4	1.1

relationships between observed variables and latent constructs. The fit indices reported in this study were  $\chi^2$  (chi square),  $\chi^2/df$  (chi square per degrees of freedom), root mean square error of approximation (RMSEA), standardized root mean square residual (SRMR), comparative fit index (CFI), normed fit index (NFI), goodness-of-fit index (GFI), Tucker-Lewis index (TLI), and incremental fit index (IFI). Composite reliability and average variance extracted (AVE) were used to estimate reliability and convergent validity of the latent constructs in the measurement model. In the second stage, structural model analysis was used to assess the estimations of model fit, path coefficients, and measures of explained variances. Examinations of the total effects of hypothesized relationships between the latent constructs were used to test the research hypotheses.

## RESULTS

### Measurement model

The measurement model that related observed variables to theoretical latent constructs was estimated and tested with the sample data by CFA. According to the results of factor loadings and model fit indices per latent construct, a reflective variable was retained only when it loaded greater than 0.50 on the relevant construct, suggesting an acceptable model fit. Thus, the initial 20 observed variables were reduced to 18 variables (Table 2).

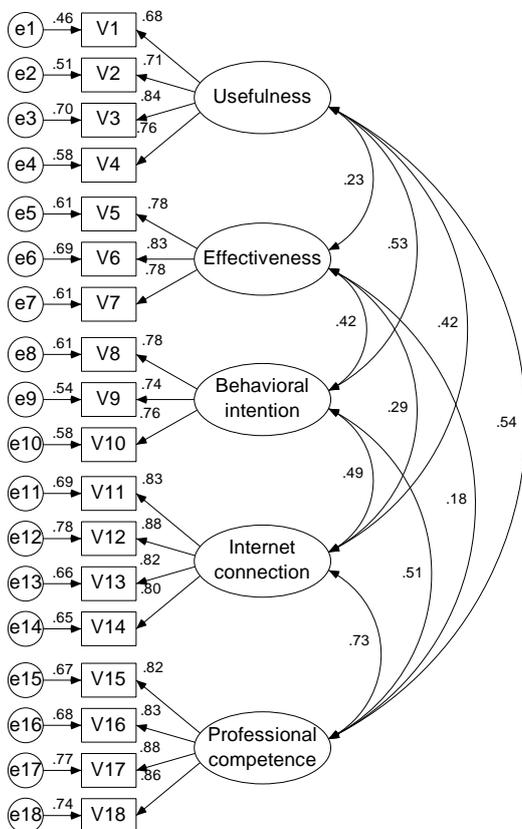
The means of the retained 18 observed variables range from 3.30 to 4.26, and SDs range from .64 to .97. Skewness measures range from -0.63 to -0.10 for these variables, and kurtosis measures range from -0.51 to 0.66. The standardized factor loadings on each variable range from .68 to .88, and measurement errors range from

.22 to .54. All observed variables had positive values of measurement error variances, and no standard errors greater than 1.0 were observed. Non-standardized factor loadings from latent constructs to an observed variable were highly statistically significant ( $p < .001$ ). These statistics showed that the measurement model with a reasonable degree did not violate the model identification rules.

The researcher used CFA to evaluate the IAPD measurement model. Figure 2 shows the structure of latent constructs for this model with the standardized parameter estimates. The measurement model was supported by the model fit

**Table 2.** Retained variables on the questionnaire

Latent construct	No.	Observed variables
Usefulness	V1	Internet is a useful tool for me to interact with people.
Usefulness	V2	Internet is a useful tool for me to enhance my occupational capacities.
Usefulness	V3	Internet is a useful tool for me to search for different information.
Usefulness	V4	Internet is a useful tool for me to solve living and working problems.
Effectiveness	V5	Internet applications can enhance the administrative performance in preschools.
Effectiveness	V6	Internet applications can improve the quality of early childhood education programs.
Effectiveness	V7	Internet applications can increase the development of teacher effectiveness.
Behavioral intention	V8	I intend to use to Internet to manage preschool practices.
Behavioral intention	V9	I intend to employ the Internet to digitalize young children’s records.
Behavioral intention	V10	I intend to adopt the Internet in early childhood program designs.
Internet connection	V11	I would attend professional training curriculum via the Internet.
Internet connection	V12	I would use Internet to search for professional materials.
Internet connection	V13	I would interact with teachers via Internet communities.
Internet connection	V14	I would employ the Internet to discuss the practices of professional development.
Professional competence	V15	I have the competence to solve professional problems via the Internet.
Professional competence	V16	I have the competence to advance professional knowledge via the Internet.
Professional competence	V17	I have the competence to integrate the Internet into my professional development.
Professional competence	V18	I have the competence to develop cooperative professional relationships via the Internet.



**Figure 2.** Measurement model

statistics:  $\chi^2 = 323.61$  ( $p < .001$ ),  $\chi^2/df = 2.59$ , RMSEA = .07, SRMR = .05, CFI = .95, NFI = .92, GFI = .90, TLI = .93, IFI = .95. The commonly used criteria were evaluated the fit indexes of the models: RMSEA < .08, SRMR < .05, CFI > .90, NFI > .90, GFI > .90, TLI > .90, IFI > .90 (Bollen, 1989; Schumacker & Lomax, 2010). The types of the GFI by CFA indicate that the measurement model was acceptable.

The composite reliability of each latent construct of the IAPD ranges from .80 to .91, and the AVE values for all constructs range from .56 to .72, as shown in Table 3. These measurements show the reasonable degree of reliability and convergent validity of the latent constructs with internal consistency, providing good reliability for all constructs. The correlation of two latent constructs ranges from .18 to .73. The squared correlation between each construct pair was less than the AVE estimates from the individual latent construct. The discriminant validity of the latent constructs was further validated by these estimates. The results suggest that the IAPD measurement model is of reasonable quality to continue examining the hypothesis testing and structural model total effects.

**Table 3.** Latent construct correlation matrix

Latent construct	Usefulness	Effectiveness	Behavioral intention	Internet connection	Professional competence
Usefulness	.84(.56)				
Effectiveness	.23(.05)	.84(.64)			
Behavioral intention	.53(.28)	.42(.18)	.80(.58)		
Internet connection	.42(.18)	.29(.08)	.49(.24)	.90(.69)	
Professional competence	.54(.29)	.18(.03)	.51(.26)	.73(.53)	.91(.72)

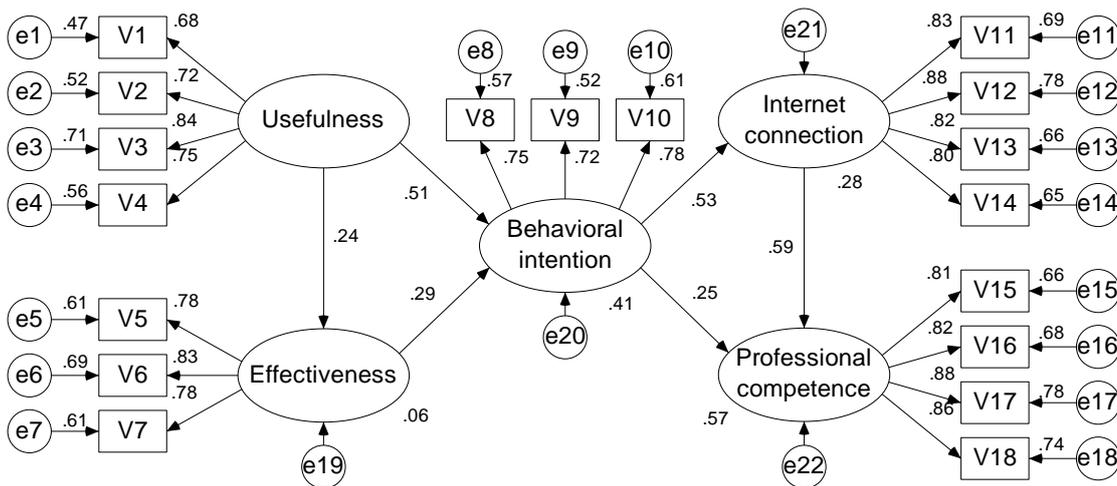
*Note.* The composite reliability of all latent constructs is given on the diagonal, with average variance extracted in parentheses; the correlation coefficient of two latent constructs is given on the below diagonal, with squared correlation in parentheses

### Structural model

Based on the good fit of the hypothesized measurement model to the sample data, the researcher used structural path-relations analysis to test the research hypotheses. Figure 3 presents the structural path of latent constructs and path coefficients in the IAPD structural model with the standardized parameter estimates. The model fit indices also obtain an acceptable fit with the sample data:  $\chi^2 = 362.04$  ( $p < .001$ ),  $\chi^2/df = 2.81$ , RMSEA = .07, SRMR = .07, CFI = .94, NFI = .91, GFI = .89, TLI = .93, IFI = .94. According to the results, the model-fit statistics support the structural model. The researcher then proceeded with testing the study hypotheses.

The standardized regression coefficients and the direct effects and measures of the explained variance are shown in Figure 3. The usefulness construct explains 6% of variance in the effectiveness construct, corresponding to a standardized regression coefficient of .24. The usefulness and effectiveness constructs jointly explain 41% of the variance in the behavioral intention construct, corresponding to standardized regression coefficients of .51 and .29, respectively. The Internet connection construct explains 28% of the variance in the behavioral intention construct, corresponding to a standardized regression coefficient of .53. The professional competence construct explains 57% of the variance in both the behavioral intention and Internet connection constructs, corresponding to standardized regression coefficients of .25 and .59, respectively. The  $p$  values of statistical significance on the IAPS latent constructs are less than .01.

According to the results, preschool teachers with positive attitudes toward improving young children's performance and the quality of teacher-parent and teacher-child interactions by applying the Internet indicated that Internet applications enhance administrative effectiveness and instructional improvement in



**Figure 3.** Structural model

preschools (a standardized total effect of usefulness on effectiveness is .24). Teachers with positive-perceived usefulness of applied Internet into preschool practices had intentions to accept or adopt the Internet to design and practice young children’s instructions (H2 a standardized total effect of usefulness on behavioral intention is .58). The attitudes of preschool teachers toward Internet-related practical behavioral intentions of use were determined by their expectations on the perceived effectiveness of administrative and instructional performances through the Internet in preschools (a standardized total effect of usefulness on behavioral intention is .29). These hypotheses showed positive relationships among usefulness, effectiveness, and behavioral intention, providing support for H1, H2, and H3.

Teacher attitudes toward Internet use and behavior were viewed as predictors to explain their engagement in Internet-based professional development activities (a standardized total effect of usefulness on behavioral intention is .53). They also suggested that the intent to use the Internet in preschools enhances teacher competences to solve professional problems and engage in Internet communities (a standardized total effect of usefulness on behavioral intention is .56). The results of path coefficients and hypothesis testing supported H4 and H5. Teacher engagement in different professional development models also positively affected their professional competence. This relationship was also positive and significant, providing support for H6 (a standardized total effect of usefulness on behavioral intention is .59). This suggested that teacher attitudes toward professional and pedagogical activities could increase their confidence and competence in Internet-related professional development. The statistical significance tests are reported at  $p < .01$  for all measures.

The total-effect value of Internet connection on professional competence measures highest on the IAPS study hypotheses for preschool teachers, suggesting that preschool teachers generally agreed that the multiple Internet-based connections of engaging in professional interactions could improve their integration competences and professional development practices. They also believed that Internet communities could encourage a problem-solving approach to enhance early childhood-education practices. A high measure of total effect was the relationship between usefulness and behavioral intention. This result implied that preschool teachers not only considered the positive perceptions of the Internet on access and use, but also preferred to take optimistic attitudes toward adopting or using the Internet to support preschool’s instruction and management. The total effect of usefulness on effectiveness remained relatively low compared to the other hypotheses. Thus, the researcher proposed a lower relationship between teacher-

perceived usefulness and preschool effectiveness through Internet compared to the advantages of Internet-based personal interaction and problem-solving. Teachers presented relatively less understanding on instructional effectiveness and administrative improvement in preschools.

## **DISCUSSION AND CONCLUSION**

Because of numerous Internet applications in daily life and education, preschool teachers cannot ignore the effects of this trend (Lim, Zhao, Tondeur, Chai, & Tsai, 2013). They acknowledge the positive values and innovations of Internet-related applications and preschool practices, and promote their professional abilities by integrating the Internet into their competence about instruction and administration in preschools (de Vries, 2013; Korkeamaki & Dreher, 2012; Vrinioti, 2013). Their beliefs could improve the competences of solving professional problems and engaging in Internet communities (Anastasiades & Vitalaki, 2011; Garvis, Twigg, & Pendergast, 2011). The above results suggest that the attitudes of preschool teachers toward professional development increased their confidence and behaviors of Internet-based applications.

As stated in earlier studies (Garvis, S., Twigg, D., & Pendergast, 2011; Korkeamaki, & Dreher, 2012; Liang, Chai, Koh, Yang, & Tsai, 2013), perceived usefulness, effectiveness, and behavioral intentions of Internet applications could be important considerations for preschool teachers' professional development. They consider the Internet to be an innovative tool for professional practices to show engagement and empowerment. Internet applications and educational communities help them highlight ongoing professional growth in preschool practices. The researcher found significant relationships between IAPD latent constructs on the IAPD. This result is notable because it corresponds to most studies on the relationship between the perceived values of employing the Internet to advance their intention and behaviors of Internet applications in preschools, evaluating the Internet as a tool for developing professional connections, and competences.

Internet applications improve their cognition of usefulness and effectiveness, and enhance their educational participation in preschool practices and professional community empowerment. Internet applications not only articulate professional discourses and practical behaviors in preschools, but also present community-member consciousness and collective participation to construct a professional community. The results showed that the intentions of preschool teachers of applying the Internet in preschool practices influenced their professional interactions and communications with other teachers. Their beliefs improved the competences of solving professional problems and engaging in Internet communities. These results suggest that the attitudes of preschool teachers toward professional development increase their confidence and behaviors of Internet-based applications.

More important, preschool teachers with positive intentions of Internet usefulness and professional identity employ the Internet to develop their knowledge, abilities, and professional development in preschools. Internet applications help preschool teachers present themselves as active, collaborative, and professional agents. Greater effort should be exerted to improve their awareness and literacy for Internet employment and professional development. Additional opportunities are needed to help preschool teachers master Internet applications and improve their cognition of innovative values and practical uses through the Internet in continuing efforts toward early childhood professional reflections and development.

Preschool teachers can use the Internet to assist their cognitive and practical professional development with the interactive experiences of preschool practices. The more accessing opportunities help them use the Internet-related tools to share with educational peers about young children learning performances and pedagogical

experiences. The related institutions can organize the Internet community to advance their awareness of social interaction and professional dialogue to deal their teaching problems. The government websites or academic institutions can build a professional community or e-learning courses to provide more useful and meaningful Internet-related tools to help their professional development.

Most preschool teachers employ the Internet-related tools to assist instructions for young children in Taiwan. The researcher focused on their attitudes towards the Internet-related professional development. With the development of innovative or interactive technology, such as the Facebook, Line, or Apps, the future study can focus on the preschool teachers' perceptions about professional development via social media or interactive Apps on the instructional applications in preschools. Measuring Internet-application attitudes with adequate statistical analysis is an important issue in research on teacher professional development. This study attempts to begin accomplishing this goal. Future studies can use the IAPD developed in this study to test professional development views held by different local areas or cultural groups in different countries. The researcher hopes to further study issues related to using the Internet community for professional development and practices of preschool teachers. Researchers and policymakers using IAPD can explore teacher views of various individual demographics, and then shape decisions on Internet-based professional development for different teacher groups that are more appropriate. New latent factors or observed variables can be added to IAPD to further explore teacher thoughts on the relationships between Internet applications and professional development, and future versions of IAPD can enhance multiple-theoretical perspectives. An enhanced understanding of teacher views toward Internet applications in preschools provides Internet-related implementation and references for innovations and high-quality early childhood professional development.

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