W) were the observed variables that were accepted as significant predictors of the TPCK-W.

Descriptive statistics were examined by using SPSS 17 program and structural equation model analysis was conducted using Lisrel 8.7 program. To test the model fit the common and suggested fit indices were used in this study; χ2 (chi-square)/df (degree of freedom), Root Mean Square Error of Approximation (RMSEA), Standardized Root Mean Square Residual, Goodness of Fit Index (GFI), Adjusted Goodness of Fit Index (AGFI), Comparative Fit Index (CFI), Non-Normed Fit Index (NNFI) and Normed Fit Index (NFI). Schermelleh-Engel, Moosbrugger, and Müller, (2003) recommended the values of fit indices are acceptable as; [χ2 /df ≤ 3], [RMSEA ≤ .08], [SRMR ≤ .10], [.90 ≤ GFI], [.85 ≤ AGFI], [.95 ≤ CFI], [.95 ≤ NNFI] and [.90 ≤ NFI].

RESULTS

Descriptive statistics and validity/reliability of instruments

Total of 50 items of the scales, T-TAM (20 items) and TPCK-W (30 items), were examined for mean, standard deviation, skewness and kurtosis. All the items' mean scores above the mid-point of 3.0, except for anxiety (negative items). Skewness indices were between .751 and -2.0 and kurtosis indices were between -1.0 and 3.9 respectively. They were within the recommended value of |3| and |10| (Kline, 2005).

Before the hypothesis testing reliability and validity evidence of instrument was tested. Using Cronbach alpha value, internal consistency was calculated for reliability. The cronbach alpha value of T-TAM was found to be as .878 and subfactors ranged: .892 (usefulness), .896 (perceived ease of use), .812 (self-efficacy), .883 (job relevance), .848 (anxiety) and .885 (intention). The cronbach alpha value for TPCK-W was found to be as .959 and subfactors ranged: .868 (GW), .828 (CW), .897 (WCK), .932 (WPCK) and .919 (ATD-W). All the subfactors showed a values greater threshold value of 0.8 (Nunnaly & Bernstein 1994) which means that all the subfactors presented a high internal consistency with their corresponding measurement indicators.

Validity studies of instruments were tested through convergent validity and discriminant validity. Convergent validity assess the degree to which two items of the same construct reflect their corresponding factor, whereas discriminant validity assessed the degree to which two conceptually similar concepts are different (Hair et. al, 2006). Table 1 presents the standardized item loadings, t values, average variance extracted (AVE) and composite reliability (CR). As shown in the table, all standardized item loadings are greater than 0.5 (except GW1) and t values are significant at 0.001. AVE values are greater than 0.5 and all CRs are greater than 0.7.

Table 1. ***Standardized item loadings, t values, average variance extracted (AVE) and composite reliability (CR)***

	Item	Item Load	T value	CR	AVE
Perceived usefulness	PU1	0,85	15.89	0.90	0.70
	PU2	0.86	16.10		
	PU3	0.85	15.65		
	PU4	0.79	14.16		
Perceived ease of use	PEU1	0.86	16.12	0.90	0.76
	PEU2	0.95	19.06		
	PEU3	0.81	14.90		
Self-efficacy	SE1	0.80	13.92	0.82	0.61
	SE2	0.71	11.90		
	SE3	0.84	14.81		
Job Relevance	JOB1	0.82	14.73	0.84	0.64
	JOB2	0.89	16.90		
	JOB3	0.86	16.05		
Anxiety	ANX1	0.79	13.54	0.85	0.66

	ANX2	0.92	16.42		
	ANX3	0.72	12.09		
Intention	INT1	0.80	14.30	0.85	0.69
	INT2	0.88	16.78		
	INT3	0.77	13.64		
	INT4	0.87	16.24		
General Web	GW1	0.40	5.76	0.89	0.55
	GW2	0.76	13.32		
	GW 3	0.78	13.81		
	GW 4	0.82	14.97		
	GW 5	0.82	15.05		
	GW 6	0.83	15.38		
	GW 7	0.71	12.24		
Communicative Web	CW1	0.67	10.96	0.84	0.57
	CW2	0.78	13.35		
	CW3	0.83	14.69		
	CW4	0.74	12.58		
Web Content Knowledge	WCK1	0.76	13.51	0.91	0.67
	WCK2	0.83	15.28		
	WCK3	0.85	15.97		
	WCK4	0.81	14.76		
	WCK5	0.85	15.85		
Web Pedagogic Content Knowledge	WPCK1	0.83	15.48	0.94	0.67
	WPCK2	0.79	14.18		
	WPCK3	0.81	14.86		
	WPCK4	0.78	14.05		
	WPCK5	0.81	14.82		
	WPCK6	0.81	15.05		
	WPCK7	0.83	15.60		
	WPCK8	0.84	15.84		
Attitudes	ATD-W1	0.80	14.60	0.92	0.68
	ATD-W2	0.83	15.34		
	ATD-W3	0.88	16.98		
	ATD-W4	0.88	16.89		
	ATD-W5	0.82	15.22		
	ATD-W6	0.76	13.59		

For the discriminant validity, square root of the average variance extracted (AVE) for each factor was compared with the correlations between that and all other factors (Table 2). It has been suggested that square roots of the AVEs should be greater than correlation coefficient between the constructs, which indicates that a construct is more strongly correlated with its indicators than with the other constructs in the model (Fornell & Larcker, 1981).

Table 2. Discriminant Validity: Correlation between constructs and square root of AVEs.

	PU	PEOU	SE	JOB	ANX	INT	GW	CW	WCK	WPCK	ATD-W
PU	**0.83**										
PEOU	0.58**	**0.87**									
SE	0.43**	0.64**	**0.82**								
JOB	0.52**	0.35**	0.40**	0.**80**							
ANX	-0.12	-0.23**	-0.26**	-0.08	**0.85**						
INT	0.59**	0.49**	0.49**	0.61**	-.04	**0.83**					
GW	0.38**	0.40**	0.41**	0.33**	-0.23**	0.32**	**0.74**				
CW	0.26**	.035**	0.40**	0.30**	-0.11	0.30**	0.44**	**0.75**			
WCK	0.53**	0.48**	0.59**	0.47**	-0.28**	0.49**	0.58**	0.58**	**0.82**		
WPCK	0.56**	0.53**	0.59**	0.53**	-0.30**	0.58**	0.56**	0.53**	0.81**	**0.82**	
ATD	0.68**	0.51**	0.52**	0.58**	-0.21**	0.57**	0.55**	0.43**	0.75**	0.82**	**0.82**

Note: Diagonal elements (in bold) represent the square root of the AVE

As seen Table 2, the square root of the AVEs for each factor was found to be higher than the correlation between constructs, providing the discriminant validity of variables.

Test of Structural Model

To test the structural model fit and hypothesized relations among variables, SEM analysis was used. The result of the analysis yielded that proposed model has good fit [$\chi^2 = 83.03$; $\chi^2/df = 2.37$; GFI=0.94 ; AGFI=0.89; CFI =0.99; NFI=0.98; NNFI=0.98; RMSEA = 0.077 and SRMR = 0.039]. Table 3 shows the path coefficients, t values.

Table 3. Path Coefficients and T value

Hypothesis	Path coefficient	T value	Result
PU→T-TAM	0.82**	14.68	H1 →Accepted
PEOU→T-TAM	0.72**	12.19	H2 →Accepted
SE→T-TAM	0.74**	12.29	H3 →Accepted
JOB→T-TAM	0.67**	11.13	H4 →Accepted
ANX→T-TAM	-0.18**	-2.60	H5 →Accepted
INT→T-TAM	0.75**	12.84	H6 →Accepted
T-TAM→TPCK-W	0.87**	10.42	H7 →Accepted
GW→TPCK-W	0.68**	8.94	H8 →Accepted
CW→TPCK-W	0.62**	8.79	H9 →Accepted
WCK→TPCK-W	0.90**	12.39	H10 →Accepted
WPCK→TPCK-W	0.92**	12.85	H11→Accepted
ATD-W→TPCK-W	0.93**	12.77	H12 →Accepted

** $p<0.01$

The results indicated that all the T-TAM variables path coefficient were significant. PU, PEU, SE, JB and INT had a positive siginificant effect on T-TAM while ANX had a negative significant effect on T-TAM as expected. PU was found to be most significant variable with the highest path coefficient as a predictor of T-TAM.

Also GW, CW, WCK, WPCK and ATD found to have posivite significant relationship with TPCK-W. Attidues (ATD) was found to be the most significant variable with the highest path coefficient as a predictor of TPCK-W.

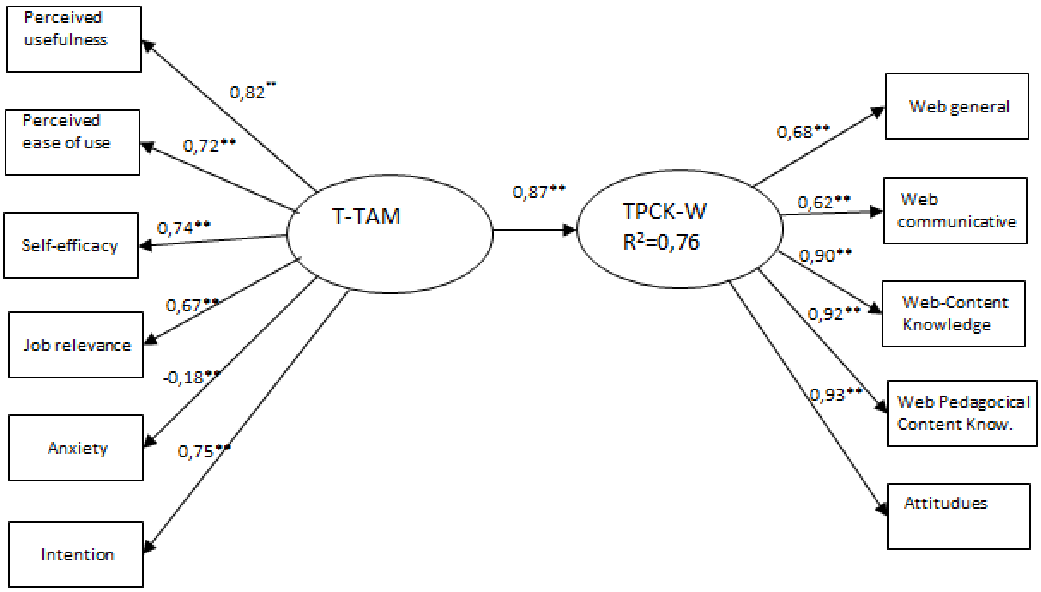

Figure 2. Structural model testing results

As the dependent variable of model, TPCK-W was found to be significantly determined by T-TAM resulting in an R^2 of 0.76 (Figure 2). R-squared-type statistics indicates the how much of the variance in the dependent variables is accounted for by the independent variables? This means T-TAM explained the 76% of the variance of TPCK-W.

DISCUSSION AND CONCLUSION

This study attempted to examine relationship between Web Pedagogic Content Knowledge and Technology Acceptance of Preservice Teachers introducing a structural model. The structural model proposed that teacher's technology acceptance will affect their web pedagogic content knowledge. Structural equation model technique was conducted to test structural relationship in model. The result showed that teacher's technology acceptance explained the 76% of the variance of their web pedagogic content knowledge. This result indicated that increasing the teachers' perception about usefulness of a technology, ease of use a technology, their self-efficacy about technology and their job related factors while decreasing technology anxiety, will lead to a higher web pedagogic content knowledge. This finding is consistent with some of the other literature findings. Kramarski & Michalsky (2015) found that teachers with high technology self-efficacy were better at translating their belief systems into TPCK-based lesson. Ertmer (2005) explained that possessing adequate technological knowledge and pedagogy will not guarantee the effective use of technology, teachers and faculty must also stand up for usefulness of technology in teaching and student learning. Luan and Teo (2011) suggested that technology-training programs should focus on developing positive perceptions of computer usefulness and its ease of use as well as to encourage positive attitudes towards computer use among student teachers. All these studies imply that to develop technological pedagogic content knowledge of web, at first teachers must accept the related technology along with positive beliefs.

The result of X-model showed that, usefulness is the strongest determinant of technology acceptance of teachers. This finding is consistent with other research results in literature of TAM in educational context (Tarhini, Hone, & Liu, 2014; Luan & Teo, 2011; Teo; 2011; Masrom, 2007; Ma, Andersson & Streith, 2005; Saadé & Bahli, 2005; Ong, Lai & Wang,2004). This means that if we can raise teachers' awareness about that technology can improve efficiency and effectiveness of teaching and learning process, teachers would decide to use technology. The result of Y-model showed that attitude toward web-based instruction had the highest explained variance by the TPCK-W. This finding indicated that if teachers have a high web pedagogic content knowledge they are likely to recognize advantages of Web-based instruction (Lee and Tsai, 2010).

TAM and TPCK are the most common theoretical frames that are used in technology integration studies. Although, both of the models describe and explain the teacher's technology usage separately from different perspectives, using these frameworks together to explain the process from acceptance to use in class, will improve the research results. This study showed the importance of technology acceptance factors and technologic pedagogic content knowledge of teachers for active technology integration into education. At this point beside the self-effort of teachers for professional development, teacher training institutions' support is very important. Tondeur et al. (2012) introduced some key strategies for teacher training institutions to prepare pre-service teachers' competencies for educational technology use; 1) using teacher educators as role models, 2) reflecting on attitudes about the role of technology in education, 3) learning technology by design, 4) collaborating with peers, 5) scaffolding authentic technology experiences and 6) continuous feedback. Further studies could examine technology integration from a holistic perspective namely, personal factors and institutional support.

This study involved the preservice teachers for the study groups. However, although student teachers are suggested as a good proxy to practicing teachers and a good measurement of future teachers' opinion (Ma, Andersson & Streith, 2005) their perception can be changed when they are practicing teacher. Future research can be designed to compare data of pre-service teachers and experienced teachers testing the proposed model in this study. Furthermore, the structural model included only T-TAM and TPCK-W in this study. However there would another factors effecting to this process. Future studies could expand the model with the affect of demographic characteristics like age, experience or gender and also internal factors like motivation, engagement and cognitive absorption.

References

Ajzen, I. (1991). "The Theory of Planned Behavior." *Organizational Behavior and Human Decision Processes*. 50(2). 179-211.

Angeli, C., & Valanides, N. (2008, March). TPCK in pre-service teacher education: Preparing primary education students to teach with technology. In *AERA annual conference, New York*.

Bagozzi, R. P. (2007). The legacy of the technology acceptance model and a proposal for a paradigm shift. *Journal of the association for information systems*, *8*(4), 244-254.

Bandura, A. (1989). Human agency in social cognitive theory. *American psychologist*, *44*(9), 1175.

Benson, S. N. K., Ward, C. L., & Liang, X. (2015). The essential role of pedagogical knowledge in technology integration for transformative teaching and learning. In *Technological pedagogical content knowledge* (pp. 3-18). Springer US.

Brzycki, D. & Dudt, K. (2005). Overcoming Barriers to Technology Use in Teacher Preparation Programs. *Journal of Technology and Teacher Education, 13*(4), 619-641.

Butler, D. L., & Sellbom, M. (2002). Barriers to adopting technology. *Educause Quarterly*, *2*, 22-28.

Chai, C.-S., Koh, J. H.-L., & Tsai, C.-C. (2013). A Review of Technological Pedagogical Content Knowledge. *Educational Technology & Society*, *16* (2), 31–51.

Davis, F. D. (1989). Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology. *MIS Quarterly. 13*(3), 319-340.

Ertmer, P. A. (2005). Teacher pedagogical beliefs: The final frontier in our quest for technology integration. *Educational Technology, Research and Development, 53*(4), 25-39.

Fishbein, M., & Ajzen, I. (1975). *Belief, attitude, intention and behavior: an introduction to theory and research.* Addison-Wesley, Reading MA.

Fornell C. & Larcker D.F. (1981) Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research. 48*, 39–50.

Hair, J., Black, W., Babin, B., Anderson, R., & Tatham, R. (2006). Multivariate data analysis (6th ed.). Uppersaddle River, N.J.: Pearson Prentice Hall.

Ho, L. H., Hung, C. L., & Chen, H. C. (2013). Using theoretical models to examine the acceptance behavior of mobile phone messaging to enhance parent–teacher interactions. *Computers & Education*, *61*, 105-114.

Horzum, M. B. (2011). Web pedagojik içerik bilgisi ölçeği'nin türkçeye uyarlaması. *İlköğretim Online*, *10*(1). 257-272.

Ifenthaler, D., & Schweinbenz, V. (2013). The acceptance of Tablet-PCs in classroom instruction: The teachers' perspectives. *Computers in Human Behavior*, *29*(3), 525-534.

International Society for Technology in Education. 2008. National education standards. Washington, DC: ISTE. Available at: www.iste.org/standards/ nets-for-teachers.aspx.

Kline, R.B. (2005), *Principles and Practice of Structural Equation Modeling* (2nd Edition ed.). New York: The Guilford Press.

Koehler, M. J. & Mishra, P. (2016). Introducing to TPACK. In M. C. Herring, M. J. Koehler & P. Mishra (Eds.), *Handbook of Technological Pedagogical Content Knowledge (TPACK) for Educators* (pp. 207-223). New York: Routledge.

Koehler, M. J., & Mishra, P. (2005). What happens when teachers design educational technology? The development of technological pedagogical content knowledge. *Journal of Educational Computing Research*, *32*(2), 131–152.

Koehler, M. J., Mishra, P., & Yahya, K. (2007). Tracing the development of teacher knowledge in a design seminar: Integrating content, pedagogy and technology. *Computers & Education*, *49*(3), 740-762.

Koehler, M., & Mishra, P. (2008). Introducing TPCK. In AACTE Committee on Innovation and Technology (Ed.), *The handbook of technological pedagogical content knowledge (TPCK) for educators* (pp. 3–29). New York: American Association of Colleges of Teacher Education and Routledge.

Kramarski, B., & Michalsky, T. (2015). Effect of a TPCK-SRL model on teachers' pedagogical beliefs, self-efficacy, and technology-based lesson design. *In Technological Pedagogical Content Knowledge* (pp. 89-112). Springer US.

Lee, M. H., & Tsai, C. C. (2010). Exploring teachers' perceived self efficacy and technological pedagogical content knowledge with respect to educational use of the World Wide Web. *Instructional Science*, *38*(1), 1-21.

Lee, Y., Kozar, K. A., & Larsen, K. R. (2003). The technology acceptance model: Past, present, and future. *Communications of the Association for information systems*, *12*(1), 50.

Liaw, S. S., & Huang, H. M. (2011). Exploring learners' acceptance toward mobile learning. In *Technology acceptance in education* (pp. 145-157). Sense Publishers.

Luan, W. S., & Teo, T. (2011). Student teachers' acceptance of computer technology. In: Teo T. (eds) *Technology Acceptance in Education* (pp. 43-61).Sense Publishers.

Ma, W. W. K., Andersson, R., & Streith, K. O. (2005). Examining user acceptance of computer technology: An empirical study of student teachers. *Journal of computer assisted learning*, *21*(6), 387-395.

Marangunic, N and Granic, A (2015) Technology acceptance model: a literature review from 1986 to 2013. *University Access Information Society*. *14*(1) 81–95.

Masrom, M. (2007). Technology Acceptance Model and E-learning. In *Proceedings of the 12th International Conference on Education*, May 21-24, Brunei Darussalam: Universiti Brunei Darussalam, 1-10..

Mazman, S. G., & Usluel, Y. K. (2010). Modeling educational usage of Facebook. *Computers & Education*, *55*(2), 444-453.

Mishra, P., & Koehler, M. J. (2006). Technological pedagogical content knowledge: A framework for integrating technology in teachers' knowledge. *Teachers College Record*, *108*(6), 1017–1054.

Moore, G. C., & Benbasat, I. (1991). Development of an Instrument to Measure the Perceptions of Adopting an Information Technology Innovation. *Information Systems Research. 2*(3), 192-222.

Nunnally, J.C. and Bernstein, I.H. (1994). *Psychometric Theory* ed.3. New York: McGraw Hill

Ong, C. S., Lai, J. Y., & Wang, Y. S. (2004). Factors affecting engineers' acceptance of asynchronous e-learning systems in high-tech companies. *Information & management*, *41*(6), 795-804.

Reid, P. (2014). Categories for barriers to adoption of instructional technologies. *Education and Information Technologies*, *19*(2), 383-407.

Rogers, E. (2003). *Diffusion of Innovation*. New York: Free Press.

Saadé, R., & Bahli, B. (2005). The impact of cognitive absorption on perceived usefulness and perceived ease of use in on-line learning: an extension of the technology acceptance model. *Information & management*, *42*(2), 317-327.

Saljoughi, F. (2002). *Adoption of M-Commerce.* Unpublished Postgraduate thesis Agder University College, Grimstad.

Sánchez-Prieto, J. C., Olmos-Migueláñez, S., & García-Peñalvo, F. J. (2016). Informal tools in formal contexts: Development of a model to assess the acceptance of mobile technologies among teachers. *Computers in Human Behavior*, *55*, 519-528.

Sang, G., Valcke, M., Van Braak, J., & Tondeur, J. (2010). Student teachers' thinking processes and ICT integration: Predictors of prospective teaching behaviors with educational technology. *Computers & Education*, *54*(1), 103-112.

Schermelleh-Engel, K. and Moosbrugger, H. (2003). Evaluating the fit of structural equation models: Test of significance and descriptive goodness-of-fit measures. *Methods of Psychological Research Online*. *8*(2). 23-74. University of Koblenz-Landau.

Shulman, L. S. (1986). Those who understand: Knowledge growth in teaching. *Educational Researcher*, *15*(2), 4–14.

Tarhini, A., Hone, K., & Liu, X. (2014). Measuring the moderating effect of gender and age on e-learning acceptance in England: A structural equation modeling approach for an extended technology acceptance model. *Journal of Educational Computing Research*, *51*(2), 163-184.

Taylor, S., & Todd, P. A. (1995). Understanding information technology usage: A test of competing models. *Information systems research*, *6*(2), 144-176.

Teo, T. (2009). Modelling technology acceptance in education: A study of pre-service teachers. *Computers & Education*, *52*(2), 302-312.

Teo, T. (2010). Examining the influence of subjective norm and facilitating conditions on the intention to use technology among pre-service teachers: a structural equation modeling of an extended technology acceptance model. *Asia Pacific Education Review*, *11*(2), 253-262.

Teo, T. (2015). Comparing pre-service and in-service teachers' acceptance of technology: Assessment of measurement invariance and latent mean differences. *Computers & Education*, *83*, 22-31.

Teo, T., Lee, C. B., & Chai, C. S. (2008). Understanding pre-service teachers' computer attitudes: Applying and extending the technology acceptance model (TAM). *Journal of Computer Assisted Learning, 24*(2), 128–143.

Thompson, R. L., Higgins, C. A., & Howell, J. M. (1991). Personal computing: toward a conceptual model of utilization. *MIS quarterly*, *15*(1), 125-143.

Tondeur, J., van Braak, J., Sang, G., Voogt, J., Fisser, P., & Ottenbreit-Leftwich, A. (2012). Preparing pre-service teachers to integrate technology in education: A synthesis of qualitative evidence. *Computers & Education*, *59*(1), 134-144.

Ursavaş, Ö. F., Şahin, S., & McILROY, D. (2014). Technology acceptance measure for teachers: T-TAM/Öğretmenler için teknoloji kabul ölçeği: Ö-TKÖ. *Eğitimde Kuram ve Uygulama*, *10*(4), 885-917.

Venkatesh, V. and Davis, F. D. (2000). A Theoretical Extension of the Technology Acceptance Model: Four Longitudinal Field Studies, *Management Science. 45*(2),186- 204

Venkatesh, V., & Bala, H. (2008). Technology acceptance model 3 and a research agenda on interventions. *Decision sciences*, *39*(2), 273-315.

Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User Acceptance of Information Technology: Toward a Unified View. *MIS Quarterly, 27*(3), 425-478.