



E-Resources & Pre-Service Teachers (PSTs): “An Assessment on Cognitive, Behaviour and Affective”

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Abstract: Electronic resources have become a more accessible and convenient method for teaching. However, the rate of using e-learning resources and materials between different education levels is not equal. Many kindergarten teachers think that hard copies of picture books are preferable to electronic picture books. Most people assume that early childhood education teachers have lower rates of utilization of electronic materials. This study investigated the usage of e-learning resources and materials of the pre-service teacher, and the survey through questionnaire was used as research design to carry out the study. Two hundred and eighty-five pre-service teachers from eight universities offering teacher education programs in Taiwan completed the web-based survey. We developed a scale called The Computer Attitudes Test (CAT) for Pre-service Teachers as our survey instrument. The Computer Attitudes Test for Pre-service Teacher consists of thirty-six items, and the format of the response to each item was five-point Likert scale. Three components of attitudes towards using computers, cognitive, affective, and behavioral components, construct these survey tools. The internal consistency was calculated using Cronbach's Alpha for each of the three components, and the correlations were also calculated for the scores between each of components and the total score. Coefficients indicate a high level of internal consistency for each attitude component. Confirmatory factor analysis was conducted and supported to construct validity of the three factors model. The results revealed that the respondents who enrolled in public schools, studied in technical universities with Natural Science as majors, and disadvantaged status were more favorable toward using e-learning resources than those who enrolled in private schools, studied in tertiary universities, major in Humanities or Social Sciences, and without disadvantaged status. The differences did not exist when their gender was taken into account. According to our result, some limitations and suggestions to the future study were discussed.

Keyword: Pre-service Teachers, Teacher Education, Attitude, e-learning, e-resources

I. INTRODUCTION AND AIM

In today's fast changing educational preferences, there are a lot of challenges for academicians of levels. In particular, school teachers face a diverse range of challenges which in turn results in facing complex pressures related to the staff daily work. Today's teachers encounter an ever-changing professional territory with a persistently fast-paced evolution, which rapidly makes their knowledge and skills obsolete and transforms the entire educational context inadvertently (Fullan, 2007). They must sustain the continuous creation of pedagogical strategies that are aimed at widening and improving their educational potential (Robinson, 2008), and the use of Information and Communication Technologies (ICT) emerges as a high potential alternative to overcome such a challenge (Unesco, 2009) One major challenge is the development and usage of electronic material, for the upcoming generation, are digital natives. These children get in touch with the smartphone, pad...etc. They are more apt to learn through these digital facilities. Activating higher order thinking capacity among students to cope up with this technological World is also challenging for teachers. So teachers must keep pace and design their curriculum and the teaching materials in digital forms instead in print forms. These children not only read picture books that print on paper, but they also want to hear the story-telling voice, even want to interact with the characters in the story through multimedia. These children not only draw their pictures on paper, but they also scribble on the pad, and will not worry about the shortage of some colors of crayons. These children also solve mathematics problems more often through googling than asking the teacher. The ability of the teacher in this new era is not how much they know and how much they memorize. It would

be while addressing a growing and complex media landscape and a technological avalanche of tools and content that they are not trained to manage, how soon they adapt to the updated educational technology, and how well they can arrange the activities and materials in their teaching careers (Cook, 2001; Houghton, Miller and Foth, 2014; Schibeci et al., 2008). These future teachers' attitude of using the e-resource will decide whether they can survive in the next education era. So this study was aimed at understanding the attitudes of the pre-service teacher, and the following research questions were addressed:

1. What are the pre-service teachers' attitudes towards using e-learning resources?
2. Do the pre-service teachers' attitude towards using e-learning resources affected by their demographic characteristics?

II. E-LEARNING RESOURCES FOR TEACHING AND LEARNING

'E-learning resources' or 'e-resources' are the terms that generally encompasses several kinds of digital materials for teaching and learning, such as an electronic library, virtual library and cloud library are used as the terms to describe collections of e-learning resources. Additionally, people usually access e-learning resources with the aid of devices such as computers, radio and television sets, and mobile phones. Moreover, people often reach e-learning resources as converting the teaching subjects into electronic forms, so that many distance learners can access the materials without differences in the location and time (Reitz 2004). However, Uziak and Oladiran (2012) argued that e-learning is not just the application of ICT in teaching, but also the expanding of learning possibilities to a new frontier in education. In this manner, e-learning challenges require more effort for equivalent or improved learning outcomes and require joint efforts from lecturers and students.

Many researchers have compared e-learning to traditional teaching in several ways, such as the improvement of learning outcome, the satisfaction of students, and the rate of course completion (Bernard et al., 2014; Chigeza and Halbert, 2014; Israel, 2015; Northey et al., 2015; Southard, Meddaug and Harris, 2015; González-Gómez et al., 2016; Ryan et al., 2016). As a cognitive and knowledge-oriented process, the complexity of learning makes the establishment of an effective e-learning platform more complicated. When reviewing the literature, we often find that teaching and learning are not only influenced by teaching format; many other factors also play significant roles. So in this study, we focus on discussing some of the factors developed by these studies.

In the 21st century with the advent of Information and Communication Technology there is an inundation of information from various sources all around the World. These technological advancements have made information sharing and accessing at fingertips. These are presenting the education field with both challenges and opportunities in the teaching practice. The challenge is to avail the best resources from authentic sources to train students in 21C skills viz. Communication, remote collaboration, critical thinking, creativity and problem solving. Just receiving information doesn't imply engaging. It's important for educational institutions to practice technology-enhanced teaching and learning to facilitate learners to acquire these skills. There are methods like flipped class, Blended learning to make use of technology in education by integrating e-resources to achieve expected outcomes with a great learning experience in this digital age. Then it all begins with the questions, are we prepared to equip our teachers with proper training? How are Pre-Service Teachers' behaviour and attitude and their knowledge of technology will help in adopting this? and how is it integrated into the teaching curriculum?, is currently a major focus of research in teacher education.

III. PRE-SERVICE TEACHERS' ATTITUDES TOWARDS USING E-LEARNING RESOURCES

Coming to Teacher Educators, many of them are adopting the use of technology in their personal lives but are not shifting this knowledge into their professions. Furthermore, researches also indicated that Pre-service teachers (PSTs) are not completely trained with adequate resources and trainings to integrate e-resources in teaching and learning (Chigona & Chigona, 2013; Sang, Tondeur, Chai, & Dong, 2014; Tondeur, Pareja Roblin, van Braak, Voogt, & Prestridge, 2017; Voogt & McKenney, 2017). Teaching with e-resources is far beyond mere adapting of technological tools but should be in a capacity to use intentionally in their teaching and learning to maximize their teaching goals. (Tondeur et al., 2017). Though the Higher Education sector is fast approaching in integrating e-resources, this doesn't imply that it is happening at the same pace in school education and other educational settings. Many researches have

pointed out that there's a huge lack of training for Pre-service teachers for their classroom teaching (Enochsson & Rizza, 2009; Tondeur et al., 2012). It is very important to train and encourage Pre-service Teachers to use technology as this brings a tremendous change in shaping the teaching practices across the educational scenario and that further reflects their future teaching and learning methodologies. Tondeur et al. (2013, p. 242) proposes to integrate technological resources in PSTs training while emphasizing the positive impacts of these resources in various disciplines.

Studies on pre-service teachers' attitudes and beliefs have revealed that future teachers are optimistic, highly confident, and humanistic as they enter teacher education programs (Richardson, 1996; Wideen et al., 1998). Several studies have examined entering pre-service teachers' beliefs and their effect on learning to teach within a teacher education program (Holt-Reynolds, 1992; MacKinnon & Erickson, 1992; Ross, Johnson, & Smith, 1992). Some research has revealed that pre-service teachers who are familiar with using e-resources may have more positive attitudes and advocated for a closer examination of the relationship between teachers' beliefs and teaching practices (Pajares, 1992; Pomeroy, 1993). The attitudes of pre-service teachers (PSTs) will lead to their self-efficacy and beliefs, and most teachers hold beliefs about their work, their roles and responsibilities, and the subject matter they teach. These beliefs provide an active link to classroom action and, ultimately, to students' classroom learning (Brownell & Pajares, 1999; Peterson, Fennema, Carpenter, & Loef, 1989). Pre-service teachers also enter teacher education programs with healthy views of teaching acquired during their previous life and schooling experiences (Brookhart & Freeman, 1992).

IV. THEORETICAL BACKGROUND

A range of studies reported their result and implication of developing e-learning resources, and discussed some factors that predict the teachers' attitude toward using e-learning resources. For example, Yang and Chang (2013) reported that the learners developed e-resources as a supplement for their biology syllabus for increasing the retention of both content and enhancing critical thinking skills. Davis (1985) used the Technology Acceptance Model (TAM) to anticipate an individual's probability of digital inventions and computer-based systems acceptance.

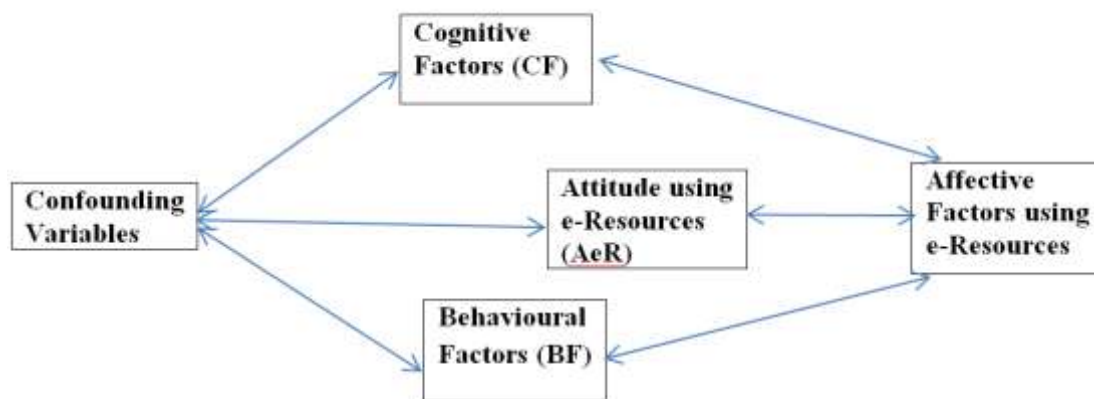


Fig.1 Research model based on Fishbein and Ajzen (1975) revised by Dwivedi, Y. K., et al. (2019)

Bagozzi and Burnkrant (1979) suggested that attitude has three components: cognitive, affective, and behavioral. Bagozzi and Burnkrant (1985) defined that the cognitive component refers to an one's particular beliefs about the specific entity, Chaiken, and Stangor (1987) elaborated that the cognitive component contains a value-based assessment, judgment, reception or perception of the object. Fishbein and Ajzen (1975) thought that the behavioral component refers to an individual's subjective probability that he or she will perform a specified behavior. McGuire(1985) argues that the affective component refers to what extent a person likes the object of his thoughts. Based on the Fishbein and Ajzen (1975) model of attitude, an instrument that measures attitudes would need to load onto the three different components of attitude: cognitive, affective, and behavioral. We brainstormed our original items, and those items were categorized into three pools by the researchers independently to assess whether there

was an agreement in the labeling of the categories for the initial pilot. This model was applied by other researchers on different technological innovation, viz. digital education (Ngai, Poon, and Chan, 2007), smartphone learning (Liu, Li, and Carlsson, 2010), e-commerce (Wu, and Wang, 2005), net/online banking (Lai and Li, 2005), and the embracing of smartphones internet (Hong, Thong, and Tam, 2006). These studies also identify variables that arbitrate between system features and the real usefulness of the system, such as perceived usefulness, perceived ease of use, attitude to use. Brown and (1992) study finds that a shortest and constructive association between a person's inclination regarding an object or behavior and that person's behavior, and the attitude is the consequence of anyone's trust regarding the behavior and the outcome of that behavior. With reference to Ajzen (1991 & 2002) and the recent studies based on his theory of Planned behaviour (Burns Micheal E., et.al 2018) stated that attitude refers to anybody's common acceptance to seize in a given behavior, it is one's productive or unproductive gauging of specified object or behavior and affective responses. Bush, A. and N. Grotjohann (2020). In their study on attitudes of First-Year PSTs collaboration in exchange, division of work and co-construction reported the differences among them.

V. METHODOLOGY

5.1 Method and tools

This study adopted a quantitative method to collect data that provided answers to the research questions for the study. We have adopted instruments developed by Fishbein and Ajzen (1975) revised by Dwivedi Y.K., et.al., (2019). It has three factors; Cognitive, Affective and Behavioural with 12 items each. Descriptive Statistics, Correlations, Chi-square, T- test, Confirmatory Factor Analysis (CFA), Path Analysis to test the model and Cronbach Alphas to check the reliability were carried out. We applied the survey method as our research methodology in the study, and a questionnaire containing closed-ended questions based on Likert scale was developed to collect our research data. To answer the research question, We used a self-developed questionnaire- The Teacher Attitudes toward Using E-resources Scale (TAUES) to evaluate the attitudes of pre-service educators toward using e-resources. The TAUES measures the three domains of attitude: (1) Cognitive (Ajzen & Fishbein, 1980): teacher perceptions of using e-resources; for example, "I know how to find the e-resources". (2) Affective g (Tsai, Chuang, Liang, & Tsai, 2011, 223): beliefs about the efficacy of using e-resources; for example, 'I like using multimedia books rather than a printed book.' (3) Behavioral (Hassan et al, 2011): perceptions of professional roles and functions; for example, 'I read books more often on electronic devices.' We invited several educational technology experts to validate the questionnaire. The research method was employed to understand and interpret Pre-service Teachers attitude to adopt technology in their natural settings (Yin, 2003). Further, this research enabled the researchers to pay keen observation to the individuals responses to notice the underlying logic of PSTs opinions. Further the collected data was thematically analyzed. Farjon, D., et al. (2019) mapped the integration of technology in the initial teacher education program of N=398 PSTs. The attitudes and beliefs were identified to be powerful influence but access to technology is meagre.

5.2 Sample

Pre-service teachers of eight universities in Taiwan served as the participants for this study. Among these eight universities, two universities are located in northern Taiwan, both northern Taiwan and central Taiwan have selected three universities as our sample. Of these universities, four types of teacher education programs are included, two for special education, four for elementary school, four for high school and two for early childhood education. A total of 285 pre-service teachers completed the questionnaire.

VI. RESULTS

6.1 Demographic information

This study aims at discussing the attitude of pre-service teachers' attitude toward e-resources. In order to address pre-service teachers' attitude toward using e-resource, the Teacher Attitudes toward Using E-resources Scale (TAUES) was administered. Pre-service teachers responded to their demographic information and thirty-six items on a Likert-type scale (i.e., from one for not important at all to five for very important). Demographic information collected from the pre-service teachers included gender, academic status (public or private school; technical or tertiary university; major in humanity and social science or natural science), and disadvantaged status. Table 1 shows the demographic and descriptive information of the participants.

Of our respondents, 23.9% are males, 76.1% are females ; 73.0% enrolled in public schools, 27.0% enrolled in private schools; 23.5% were from technical university, 76.5% respondent were from tertiary university; 54.0% major in natural science, 46.0% major in humanity or social science; 7.4% were disadvantaged students, 92.6% were ordinary students.

Table1 Demographic and descriptive information of the participants

Variable	level	Frequency	Percent
Gender	male	68	23.9%
	female	217	76.1%
Public	public	208	73.0%
	private	77	27.0%
University	technical	67	23.5%
	tertiary	218	76.5%
Department	natural science	154	54.0%
	humanity or social science	131	46.0%
Disadvantaged	disadvantaged	21	7.4%
	ordinary	264	92.6%
Total		285	100.0%

6.2 Reliability and validity analysis

Before the survey of the questionnaire, TAUES was presented to several experts to improve face and content validity. Reliability was examined using Cronbach's alpha values for each variable. As shown in Table 2, the values of all subscales were above .82, which is a commonly accepted level. The reliability of cognitive, affective, and behavior subscales are .825, .861, and .968. We test the construct validity through the first-order Confirmatory Factor Analysis based on the Fishbein and Ajzen's (1980) three components model of attitude was conducted. Results indicated a good fit for the three components construct: As for model fit index, $\chi^2 = 26.383$, $df = 24$, $p = .334$, $\chi^2/df = 1.099$. Model fit statistics determine how well the various models fit the data, the chi-square tests the consistency of the covariance pattern among the observed variables, and the smaller the chi-square statistic is, the better the model fit. The chi-square/degrees of freedom ratio (χ^2/df) is most often used to determine fit, for the chi-square statistic is sensitive to sample size. This CFA model had a goodness-of-fit according to this standard.

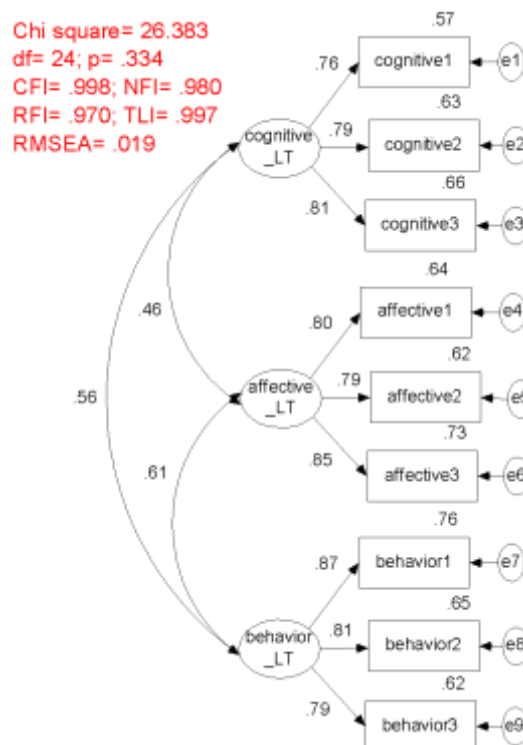


Figure 2. Construct validity through first-order CFA

As for Goodness-of-fit statistics of the CFA model, GFI= .980, AGFI=.962, all larger than .90, and showed a goodness-of-fit, for the closer the GFI and AGFI are to 1.0 the better the model fits the data. Generally, GFI and AGFI values larger than 0.9 indicate a good model fit (Hu & Bentler,1999 & 1998). This CFA model also had a goodness-of-fit according to this standard. As for the comparative fit index of the CFA model, NFI=.980, TLI=.997, CFI= 0.998, RMSEA=.019. The NFI, TLI, and CFI all compare the improvement in the fit of the proposed model over the null model, with measures closest to 1.0 indicating ideal fit. Values above 0.9 are considered excellent. The RMSEA considers the error of approximation in the population. Thus the higher the RMSEA value, the more errors in approximation, a value closer to 0, ideally below 0.8, is preferable (Weston & Gore, 2006). All the index reach an excellent standard, which means our survey data support this CFA model. The first-order CFA model is shown in Figure 2. (Şimşek, 2007; Çokluk, Şekercioğlu & Büyükoztürk, 2010).

To test the overall model (multigroup analysis) path analysis was conducted to see the standardized effects of factors on variables. Table 2 shows the effects of all variables in the study. Path analysis indicates the direct effect of a coefficient on variables. Paths may not be equal across groups and it can be moderated. Any Chi-square more than the threshold will be variant for a path by path analysis. The following table indicates the indirect effect of each variable on one another. 0.3 is considered as medium effect, values greater than or equal to 0.5 are considered as higher. (Cohen, 1988 cited in Timothy, 2009). This study examined the higher effect of H5 from AeR to CF(0.85). The values in path analysis shows that the chi-square value was significant ($\chi^2=26.383$, $df=24$, $CFI=.998$, $p=.334$). T-values are also found to be significant among the variables.

Table 2. Analysis of Hypotheses.

Hypotheses	Path	Path coefficient	t-values	Results
H1	CF-BF	0.56	11.30	Supported
H2	CF-AeF	0.46	9.70	Supported
H3	AeF-BF	0.61	8.90	Supported
H4	AeF-AeR	0.81	9.60	Supported
H5	AeR-CF	0.85	11.30	Supported
H6	AeR-BF	0.79	10.61	Supported

6.3 Descript analysis of preservice

To address pre-service teachers' attitudes toward using e-resources, we computed the TAUES's total scores of the whole scale and subscales on by averaging individual item's scores. Higher scores on the TAUES indicate that respondents felt the statements about using e-resources were important or agree, and lower scores indicate that respondents felt the statements were not important or disagree. For the whole scale, the range of individual item's mean scores was 3.04 to 4.10, total whole scale's mean scores were 4.02 (SD = .89).

For the cognitive subscale, the range of individual item's mean scores was 3.04 to 4.10, total cognitive subscale's mean scores were 4.02 (SD = .89). Average scores on six of the items were above three points five, indicating that the respondents felt the statements were more important than not important. For the affective subscale, the range of individual item's mean scores was 3.10 to 4.05, total affective subscale's mean scores were 4.00 (SD = 1.06). Average scores on six of the items were above three points five, indicating that the respondents felt the statements were more agree than disagree. For the behavioral subscale, the range of individual item's mean scores was 3.16 to 4.04, total behavior subscale's mean scores were 3.98 (SD = 1.08). Average scores on eight of the test items were above five, indicating that respondents felt the statements were more frequently than rarely. Table 2 shows the mean scores, standard deviations, maximum scores, and minimum scores of the whole scale and each subscale.

Table 2: Descriptive statistics and correlation among study variables

	mean	standard deviation	max	min	whole scale	cognitive	affective
whole scale	4.02	0.89	4.10	3.04			

cognitive	4.05	0.98	4.10	3.04	0.82		
affective	4.00	1.06	4.05	3.10	0.86	0.57	
behavior	3.98	1.08	4.04	3.16	0.87	0.57	0.63

Correlation between the whole scale and each subscale are .82, .86, and .87 demonstrated a strong relationship on the construct of TAUES. All correlations reach significance at $p < 0.01$, illustrating that each component contributes to the total score. Correlation values among subscales were also excellent, measuring .57 between the cognitive component and affective component, .57 between the cognitive component and behavioral component, and .63 between the affective component and behavioral component. The results of the bivariate Pearson's correlation coefficients are shown in Table 2.

6.4 T-test and analysis of variance

To identify the differences in pre-service teachers' attitude toward using e-resources depending on gender, we performed an independent sample T-test, where gender served as the factor, and the total score and three components of attitude served as the outcome variable. With the Levene's test for homogeneity of variance was assumed ($F = .83, p = .362$), there was no significant difference in a total score between male and female, $t(283) = -1.65 (p = .100)$, two-tailed with male 3.86 ($SD = .11$) scoring lower than female 4.07 ($SD = .06$). The magnitude of difference in the mean $-.20$ (95% CI: $-.45$ to $.04$) was small. Mean score of a cognitive subscale for groups who are male and female were 3.98 ($SD = .12$) and 4.08 ($SD = .07$). The Levene's test for equality of variance showed that $F < .01 (p = .997)$, as a result of checking the equal variances assumed as $t(283) = -.68 (p = .496)$. Mean score of an affective subscale for groups who are male and female were 3.73 ($SD = .14$) and 4.09 ($SD = .07$). The Levene's test for equality of variance showed that $F = 6.21 (p = .013)$, therefore equal variances were not assumed, so checking the $t(98.56) = -2.29 (p = .024)$. Mean score of a behavioral subscale for groups who are male and female were 3.88 ($SD = .13$) and 4.01 ($SD = .07$). The Levene's test for homogeneity of variance showed that $F = .16 (p = .691)$, as a result of checking the equal variances assumed as $t(283) = -.90 (p = .68)$. Overall, the effect of gender was statistically significant with an alpha level of .05 on affective subscale, but no significant difference was shown on total score, cognitive subscale, and behavioral subscale. The results of the independent sample t-test are shown in Table 3.

Table 3: Independent t-test for gender on attitude whole scale and subscale

	N	Mean	SD	F(Levene's Test)	Sig.	T	df	Sig. (2-tailed)	
Whole scale	male	68	3.86	.11	.83	.362	-1.65	283	.100
	female	217	4.07	.06					
cognitive	male	68	3.98	.12	.00	.997	-.68	283	.496
	female	217	4.08	.07					
affective	male	68	3.73	.14	6.21	.013	-2.29	98.56	.024
	female	217	4.09	.07					
behavioral	male	68	3.88	.13	.16	.691	-.90	283	.368
	female	217	4.01	.07					

With the Levene's test for homogeneity of variance was not assumed ($F = 4.12, p = .043$), there was significant difference in total score between group of public schools and private schools, $t(124.04) = 8.66 (p < .001)$, two-tailed with public schools 4.28 ($SD = .76$) scoring higher than private schools 3.32 ($SD = .85$). The magnitude of difference in the mean $.95$ (95% CI: $.76$ to 1.17) was significant. Mean score of a cognitive subscale for groups which are public schools and private school were 4.26 ($SD = .86$) and 3.51 ($SD = 1.07$). The Levene's test for equality of variance showed that $F = 8.39 (p = .004)$, as a result of checking the equal variances not assumed as $t(114.28) = 5.50 (p < .001)$. Mean score of an affective subscale for groups which are public schools and private school were 4.26 ($SD = .96$) and 3.31 ($SD = 1.02$). The Levene's test for equality of variance showed that $F = 2.87 (p = .#)$, therefore equal variances were assumed, so checking the $t(283) = 7.34 (p < .001)$. Mean score of a behavioral subscale for groups which are public schools and private school were 4.29 ($SD = .93$) and 3.15 ($SD = 1.03$). The Levene's test for homogeneity of variance showed that $F = .42 (p = .519)$, as a result of checking the equal variances assumed as $t(283) =$

8.91 ($p < .001$). To sum up, the effect of type of schools was statistically significant with an alpha level of .05 on total score, cognitive subscale, affective subscale, and behavioral subscale, the results of the independent sample t-test are shown in Table 4.

Table 4: Independent t-test for type of school on attitude whole scale and subscale

	N	Mean	SD	F(Levene's Test)	Sig.	t	df	Sig. (2-tailed)	
Whole scale	public	208	4.28	.76	4.12	.043	9.11	283	.000
	private	77	3.32	0.85					
cognitive	public	208	4.26	.86	8.39	.004	6.08	283	.000
	private	77	3.51	1.07					
affective	public	208	4.26	.96	2.87	.091	7.34	283	.000
	private	77	3.31	1.02					
behavioral	public	208	4.29	.93	0.42	.519	8.91	283	.000
	private	77	3.15	1.03					

With the Levene's test for homogeneity of variance was not assumed ($F=59.07$, $p < .001$), there was significant difference in total score between group of technical universities and tertiary universities schools, $t(258.02) = 11.42$ ($p < .001$), two-tailed with technical universities 4.69 (SD=.38) scoring higher than tertiary universities schools 3.81 (SD = .90). The magnitude of difference in the mean .88 (95% CI: .73 to 1.03) was significant. Mean score of a cognitive subscale for groups who are technical universities and tertiary universities were 4.68(SD=.44) and 3.86 (SD = 1.02). The Levene's test for equality of variance showed that $F=41.68$ ($p < .001$), as a result of checking the equal variances not assumed as $t(255.38) = 9.44$ ($p < .001$). Mean score of an affective subscale for groups who are technical universities and tertiary universities were #4.60(SD=.051) and #3.82 (SD = 1.12). The Levene's test for equality of variance showed that $F=52.54$ ($p < .001$), therefore equal variances were not assumed, so checking the $t(244.24) = 8.00$ ($p < .001$). Mean score of a behavioral subscale for groups who are technical universities and tertiary universities were 4.77(SD=.51) and 3.74 (SD = 1.10). The Levene's test for homogeneity of variance showed that $F=67.62$ ($p < .001$), as a result of checking the equal variances assumed as $t(238.66) = 10.57$ ($p < .001$) Overall, the effect of type of university was statistically significant with an alpha level of .05 on total score, cognitive subscale, affective subscale, and behavioral subscale, the results of the independent sample t-test are shown in Table 5.

Table 5: Independent t-test for gender on attitude whole scale and subscale

	N	Mean	SD	F(Levene's Test)	Sig.	t	df	Sig. (2-tailed)	
Whole scale	technical	67	4.69	0.38	59.07	.000	7.73	283	.000
	Tertiary	218	3.81	0.90					
cognitive	technical	67	4.68	0.44	41.68	.000	6.42	283	.000
	Tertiary	218	3.86	1.02					
affective	technical	67	4.60	0.51	52.54	.000	5.56	283	.000
	Tertiary	218	3.82	1.12					
behavioral	technical	67	4.77	0.51	67.62	.000	7.41	283	.000
	Tertiary	218	3.74	1.10					

With the Levene's test for homogeneity of variance was not assumed ($F=28.37$, $p < .001$), there was significant difference in total score between group of disadvantaged and ordinary, $t(154.72) = 12.91$ ($p < .001$), two-tailed with disadvantaged 4.81 (SD=3.96) scoring higher than ordinary 3.96 (SD = .90). The magnitude of difference in the mean .85 (95% CI: .72 to .98) was significant. Mean score of a cognitive subscale for groups who are disadvantaged and ordinary were 4.80(SD=.26) and 3.99(SD = .99). The Levene's test for equality of variance showed that $F=20.86$ ($p < .001$), as a result of checking the equal variances assumed as $t(82.09) = 9.54$ ($p < .001$). Mean score of an effective subscale for groups who are

disadvantaged and ordinary were 4.77(SD=.24) and 3.94(SD = 1.08). The Levene's test for equality of variance showed that $F=26.46$ ($p<.001$), therefore equal variances were not assumed, so checking the $t(117.50) = 9.91$ ($p<.001$). Mean score of a behavioral subscale for groups who are disadvantaged and ordinary were 4.85(SD=.35) and 3.91(SD = 1.09). The Levene's test for homogeneity of variance showed that $F=36.21$ ($p<.001$), as a result of checking the equal variances assumed as $t(59.10) = 9.19$ ($p<.001$). To sum up, the effect of disadvantaged status was statistically significant with an alpha level of .05 on total score, cognitive subscale, affective subscale, and behavioral subscale. The results of the independent sample t-test are shown in Table 6.

Table 6: Independent t-test for gender on attitude whole scale and subscale

	N	Mean	SD	F(Levene's Test)	Sig.	t	df	Sig. (2-tailed)
Whole scale	disadvantaged	21	4.81	0.17	28.37	.000		
	ordinary	264	3.96	0.90				
cognitive	disadvantaged	21	4.80	0.26	20.86	.000		
	ordinary	264	3.99	0.99				
affective	disadvantaged	21	4.77	0.24	26.46	.000		
	ordinary	264	3.94	1.08				
behavioral	disadvantaged	21	4.85	0.35	36.21	.000		
	ordinary	264	3.91	1.09				

6.5 Multiple linear regression analysis

A multiple linear regression analysis was used to develop a model for predicting pre-service teachers' attitude toward using e-resources from their gender, enrolled in public schools or private schools, study in technical universities of tertiary universities, major in humanity and social science or natural science, and with disadvantaged status or ordinary status. All five predictors were entered into the model, as shown in Table 7. The resulting model was statistically significant, and the five factors accounted for 37% of the variance of the total score of attitude, $F(5, 279) = 32.80$, $p<.001$. Among these five factors, three predictors had significant positive effects on pre-service teachers' attitude to use e-learning resources. An examination of the standardized beta weights indicates that the greatest contributors to the prediction model were enrolled in public/private schools ($\beta = 0.39$, $p< 0.001$), study in technical/tertiary universities ($\beta = 0.27$, $p< 0.001$), and major in humanity and social science or natural science ($\beta = 0.16$, $p< 0.001$). Besides, there were no multicollinearity problems since the VIFs for the constructs ranged in value from 1.02 to 1.18.

Table 7: Results of the multiple regression analysis predicting total score of attitude to use e-resources

	B	Std. Error	Beta	t	Sig.	VIF
(Constant)	6.13	0.43		14.12	0.000	
gender	0.07	0.10	0.03	0.69	0.489	1.02
public university	-0.79	0.10	-0.39	-8.03	0.000	1.05
department	-0.58	0.11	-0.27	-5.32	0.000	1.18
disadvantaged	0.29	0.09	0.16	3.36	0.001	1.04
d	-0.34	0.17	-0.10	-1.96	0.052	1.12

VII. FINDINGS

Teaching is all about bringing a teacher's knowledge in his/her discipline and envisioning concepts by using appropriate tools to make learning possible. Shulman (1986) emphasized on looking at all these as one entity rather than separately. Mishra and Koehler (2006) adds to Shulman by stating that "It's not just the knowledge of technology but the adaptability of e-resources and integrating them as teaching

resources is all required. The responses solicited data on how Pre-Service Teacher Educators were accessing digital technology in lesson preparation, their easeness in availing the institutional facilities and their comprehension and execution of this study's conceptual frameworks. The following were themes that arose and formed to appropriation of the constructs:

- e- resources mediated teaching-learning evaluation policies;
- Autonomy in Content specific instructional resources;
- Teacher and Teaching development and e-resources;
- e-discussions in the pre-service teacher preparation.

e- resources Mediated Teaching-Learning Evaluation Policies

Knowledge of e-resources is the key issue to any educator's conception in teaching-learning environment (Graham, Borup, & Smith, 2012; Voogt & McKenney, 2017). In other words, e-resources are available in abundance but it depends on individuals capacity to own this knowledge as fast as one can. Thus it will become an educator's unique knowledge of appropriating the e-resources that fit into the content in turn make it interesting and understandable to the learners by using more examples, activities and presentations (Guerrero, 2010). At this instance, it is understood that the PSTs ability to examine the uses of e-resources based on their teaching-learning objectives that have been posed to be attained. Major initiatives in education are possible only with teaching policies. To make a new policy it is important to educate the concerned. When it comes to educating the teachers about e-resources is only by communicating about e-Learning educational process and in present context (Anderson, 2003). Hence 21st century can be digital learner centered only when educational policies are made to bring a wanted change in the teaching-learning process. A participant in interview indicated how they are they are flexible, ease and comfortable in using technology in communicating with the students, if it becomes a policy to bring educational reformation:

...e-resources are easy to access and we find lots of learning materials to better train the students, if using these resources are made use in evaluation of learning materials then it would bring fair evaluation for all.

Autonomy in Content Specific Instructional Resources

Interview Participants shared their enthusiasm to integrate e-resources, however, they were appropriating the e-resources conveniently and it may not be the same with everyone. Further, at a later level to make use of technology for sharing course materials, assignments and taking online tests, institutional support and training will equip PSTs to enhance e-learning. In other words, PSTs can use ICT at alternative and augmentation levels. However, the researchers believe that the PSTs need to be empowered both by the Education Ministry at central and institutional level. This furthers their capacity to find authentic resources available online. exercises and practice materials available online for students with different tools and techniques provide immediate feedback. This e-learning emphasises conventional teaching strategies (Roblyer & Doering, 2014). When PSTs are motivated to use e-resources by experiencing their benefits and better suitable materials for their curriculum goals a participant clearly states how autonomy to choose teaching materials makes instruction joyful:

I can choose many activities for my teaching and can make use of online practicing materials and thus meet my learning goals, well I prefer multimedia books rather than a print book. It makes me understand better and feel comfortable.

Teacher and Teaching Development and e-resources

PSTs are already progressing to substitute e-resources with traditional teaching resources but more to be done to meet the 21st Century educational needs. Mishra and Koehler (2008) relate content knowledge and pedagogy enhance and transform the educators in meeting the learning goals when given the appropriate and relevant training. Furthermore, the implementation of what teachers were trained is much depended on subject specific demonstrations. It also expressed by the participants that there is a need of specific instructional software for both experienced and novice users of digital resources. A participant shared how software is:

....the software interfaces are learner friendly. No hiccups in following stepwise procedures of the material provided.

e-learning Activities in the Pre-Service Teacher Preparation

There should be a teaching framework for PSTs around teaching with e-resources and advance into application of integration in periodic teacher training. This kind of approach enables PSTs to be comfortable using e-resources (Stokes-Beverley & Simoy, 2016). Teacher Educators in this study, though not expert users of digital resources, can find the resources for their lesson and integrate in their daily teachings. A teacher educator, when asked about her knowledge and adoption, summed up by saying:

Ummm.... given technology at our disposal I prefer to spend my time on designing and developing my content. Using technology enriches the students learning process. How can I increase my technical efficacy.....

VIII. DISCUSSION AND CONCLUSION

In this paper, we addressed the question of whether pre-service teachers hold the positive attitude of using e-resources, and whether the academic factors and demographic factors could have some effects on the using of e-resources. We tackled these questions by investigating a sample of the pre-service teacher through our survey instrument- The Computer Attitudes Test for Pre-service Teacher, which consisted of cognitive, affective, and behavioral components as the construct. As the results in the above section show, a confirmatory factor analysis supported the three-factor construct according to the collected data of our survey. Based on the result presented in this paper, strong correlations exist among the three components, and cognitive component was higher than the affective component and in turn, higher than the behavioral component. This is consistent with the previous finding and that the attitude of using e-learning resources could be applied into a wide range of subject such as health education (Sung, Hwang and Yen, 2015), energy education (Yang, Chien & Liu 2012), Newtonian physics (Shute, Ventura and Kim, 2013), citizenship education (Lim and Ong, 2012), language teaching (Reinders and Wattana, 2014). Therefore, Teacher Training Programs should be used to broaden teachers' perspective and applications of teaching technology, and consistent with previous research which found that teachers believed they lack appropriate education on how to use educational technologies because of their lack of time, training, and economic support as the key factors. (Demirbilek & Tamer, 2010; Mumtaz, 2000). Our survey also elaborated four factors of academic attributes that have impacted pre-service teachers' attitude to use e-resources. In our multiple regression analysis models, these variables significantly influenced the total score of attitude, and this outcome confirmed existing literature that the academic attributes delivered consistent results (Zhang et al., 2004).

The future study could extend the survey to some environmental factors and users' experiences factors, such as modern tools, media-rich content, and innovative pedagogical approaches. Engaged online communication and meaningful presentations could also motivate pre-service teachers to use web resources, and enabling them to be capable of managing the resources. People often perform better and set higher achievement goals when they made some effort and felt satisfied in the learning process. That means when an appropriate condition is met, a specific type of learning can be best promoted. When someone is in the process of self-discovery, it urges him to anticipate new goals and purposes, and become less fearful of new learning opportunities. So, our further aim is to study the attitude of the pre-service teachers through regular evaluation of their performance, and see how they are accepting feedback and benefiting from the processes.

Although this study was designed with our utmost care, inevitably, there are some limitations. One main limitation of this study was to use convenience sample that may not have a good representation of the target population, and future research should control this variable to overcome this limitation that better represents the target population. Secondly, it was evident that results would be influenced by specific characteristics and culture of the group and might fail to bring generalizations applicable to any other group because culture affects human behavior, future research should be developed within a cross-cultural framework in order to gain a better knowledge of cultural differences. Thirdly, the modes sample size was a potential problem, and a more extensive and representative sample will be needed in our future study. Finally, we admit the subjectivity associated with the analysis concerning the using e-resources, the sensitivity of the results due to this subjectivity should be investigated in future work. Despite the limitations, this study contributes to our understanding of pre-service teachers' attitude and its factors toward e-learning resources and supports the literature that the utilization and development of electronic teaching material are favorable for the instructor and the students.

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