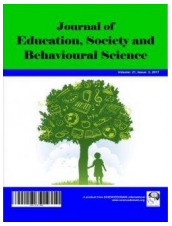

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Learning Readiness for Professional Development in Cloud Apps for Education: The Demographic Analysis of Teachers in Thailand

C. N. Bekolo[1*] S. Yufen[1] and S. Ngamsom[2]

[1]Department of Management and Economy, University of Electronics Science and Technology of China, China.
[2]English for Integrated Study (EIS) Association, Thailand.

Authors' contributions

This work was carried out in collaboration between all authors. Author CNB designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Authors SY and SN managed the analysis of the study and data collection respectively. All authors read and approved the final manuscript.

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ABSTRACT

The teaching profession in Asia in general, particularly in Thailand, is female dominated and more and more aging. As of 2012, approximately 56% of teachers in Thailand were women. 68% of the country's basic education teachers and 61% of vocational education teachers are supposed to retire within the next 15 years. With the introduction of cloud computing in teaching, this study investigate the direct and indirect effect of age, gender and past training experience of 213 teachers on learning readiness for professional development in Google apps for education(GAFE). The results using multiple regression and sample paired test reveal that the model predicts 41% of variance on learning readiness (R^2 = .413) with female teachers above the age of 36 showing higher learning readiness to integrate GAFE in teaching.

**Corresponding author: E-mail: bekolo.celestin@gmail.com;*

Keywords: Learning readiness; professional development; cloud computing; age; gender.

1. INTRODUCTION

The education sector has gone through a large scale of transformations during the last few years. One of the majors set of turbulences in this sector was triggered by the emergence of cloud computing technology which has taken the world wide classroom by storm and reshaped most of the process related to learning, teaching, and administration [1,2,3]. The advantages brought by cloud computing in the education sector are its potential to facilitate collaboration, availability of online applications [4,5], flexibility to create learning environments [6], support for mobile learning [7,8], computing intensive support [9,10] scalability [11], and cost saving in hardware and software [12]. This disruptive innovation has triggered an increased need for professional development (PD) among educational practitioners in general and particularly those in developing countries [13,14,15]. The effort in PD training for cloud computing is in order to (1) build up and sustains teachers' skills to use cloud computing tools in the teaching context [14], (2) change teachers' attitude towards adopting of this new technologies [16,17,18,19], and (3) increase the acceptance of the new technology, which is important for effective use [20]. In Thailand, for instance, commercial providers like Google in collaboration with the Ministry of Education (MOE) have provided supported teams to ensure that education institutions are equipped with adequate infrastructure that support a digital learning environments(DLEs). The support includes (1) running technical workshops and consultations, (2) training teachers in how to implement technology in the classroom effectively and (3) establishing guidelines to help Thailand's educational system become cloud-ready. However, in many cases, participation in PD is optional, and when it is mandatory there is no way of ensuring teachers' optimal engagement in these learning experience. In this context, the teachers' engagement to learn in PD program is based on their willingness. As it is supported in many findings, teachers' will to learn is a prerequisite for any engagement in learning activity [21,22,23,24,25]. This means that, teachers' motivation to be involved in new learning experience, such as cloud computing training program, should be fundamental for the success of the program including active learning and transfer of learning at work place. However, according to the socio-emotional selectivity theory and recent empirical evidences this willingness to learn decreased with age [26], varied with gender, and depend on past training experience [27,28].

In the present study, we related teachers' learning readiness as it determines the extent to which teachers are prepared to enter and participate in training program [29] to teachers' age, gender and past training experience. The examination of teachers' learning readiness as against to their demographic variables is very important because, individual differences are critical factors in education research. The authors believed that a better understanding of teachers' difference will benefit the current effort in promoting cloud computing in basic education.

2. LITERATURE

2.1 The Socio-emotional Selectivity Theory and Learning Motivational Beliefs

The Socio-emotional Selectivity Theory (SST) is a life-span theory of motivation. This theory posits that, as time horizons shrink, as they typically do with age, people become increasingly selective, investing greater resources in emotionally meaningful goals and activities [26]. SST suggests that preferences, selection of activities, goals, and goal pursuit are linked to the perception of time. When time is perceived as open-ended, long-term goals and goals that optimize the future, such as knowledge acquisition, are prioritized. In contrast, when time is perceived as limited, goals linked to short-term benefits are prioritized. Consequently, teachers who perceive their remaining time at work as constrained might feel less confident about mastering new job-related skills than those who perceive their remaining time as open-ended. And as they subscribe to a more long-term perspective, teachers with an open-ended perceived remaining time would attach greater importance to learning activities. In contrast, those who perceive their professional future as constrained might value learning activities less.

In the light of the SST ,literature proposes a negative relationship between workers' age and their motivation to learn based on the argument

that older workers focus less on professional development than their younger colleagues because of the changes in motivational structures across the life span [17,26]. Few studies in the education sector have shown that, older teachers are more resistant to change [27] and therefore less motivated to learn an innovation. Older teachers are characterized by the fact that, they are more attached to routine. This attitude reflect a form of insecurity and can determine resistance to change susceptible of creating discomfort such as, change determined by the necessity to use new technologies in the teaching activity [27]. In PD participation, teachers who are young with less experience show positive attitude when compared to old teachers [30].

This inverse relationship between motivation to learn and teachers' age is further supported in the ICT domain with the dichotomy of digital immigrant and digital native prone by Prensky (2001). This author posited that digital immigrants (born prior to the early 1980s) interact with technology on a heightened learning curve and view emerging tools as novelties, whereas digital natives (born during or after the early 1980s) have come of age immersed in the information and communication technology- rich environment and are thought to be more comfortable with existing in a state of constant "beta" [31]. Researches done using this dichotomy have provided empirical evidence that, age cohorts are distinct in the way they used and relate to new technology [32,33] According this logic, teachers with less than 37 years old will show a higher level of learning readiness for cloud computing when compare to those above 37 years old. However, findings supporting the negative relationship between age and motivation to learn are not consistent in all studies. For instance, Richter, Kunter, klusman, Ludtke, and Baumert (2011) found that older teachers spent more time reading about PD than their younger colleagues. This finding indicates that older teachers do not invest less time in professional development than their younger peers, but rather that they prefer different media or learning opportunities [28]. Similarly, Colquitt et al. (2000) found that the impact of age on motivation to learn was only partially mediated by self-efficacy, valence, and job involvement. More studies in ICT have found no statistically significant difference in using ICT across age demarcation or experience [34,35]. The mixed findings relating age variable to learning readiness has called for more empirical investigation on demographics variables including age and gender.

2.2 The Role of Gender in the Motivation to Learn in PD for Cloud Computing

Gender has been shown to lead to difference in people's perception and utilization of the internet [36] and gender is moderator of interest in educational research. Findings related to gender difference and the motivation to learn in PD are not consistent. With respect to PD participation in general, some researchers have found that female's teachers have positive attitude when compared to male [30,37]. This findings are also supported in studies done in sociology which claim that women are more expressive and tend to focus more on task –oriented activities [38,39]. But in PD focusing on Information Communication Technology (ICT), recent findings indicates that women are less eager to use ICT in teaching [40,34]. Some studies have argue that, female are more anxious in using ICT when compare to men [40,41]. However, some others studies shows no statistical significant difference between male and female regarding using or learning tool relating to cloud computing [41,32,34,36] calling for further investigation on the gender variable.

2.3 Prerequisites for PD in Cloud Computing

New technology such as cloud computing requires prerequisite knowledge, skills, attitude and a level of preparedness here referred as learning readiness. Cloud computing is defined as an emerging IT development, deployment and delivery model, enabling real-time delivery of products, services and solutions over the Internet [42]. Cloud computing offers delivery of low-cost or free applications anywhere on the Internet which makes it a promising prospect for educational institutions faced with budget restrictions and more virtually connected student population [43]. All over the world, education institutions are investing into cloud applications with aim to improve and expand teaching and learning [12]. Cloud computing platform such as Google Apps for Education (GAFE), which was developed by Google, offers schools a core suite of productivity applications for free. These communication and collaboration apps include Gmail, Calendar, Drive, Docs, Google classroom ,sites, and a G suite for education account which unlocks access to dozens of other collaborative tools supported by Google [44]. All these

applications exist completely online (or in the cloud), meaning that all apps can be accessed from any device with an internet connection. Once a school decides to adopt the G Suite for Education, they can register their school domain, and administer all teachers and students account from an administrative dashboard. However, despite these advantages brought by cloud applications, the success of the implementation of this innovation depend on the teacher's ability in using ICT tool. Teachers' ICT experience will help to quickly understand how to use the cloud tools. Also teachers past training outcomes have an impact on future training learning readiness. Studies have found that ,if trainee expected resistance to change , lack of supervisor support, or received negative personal outcomes from previous attempt to apply training , the level of readiness for future training is less positive [45,46].

2.4 Research Questions

The Thai teaching population is aging. In 2013, the Office of the Teacher Civil Service and Educational Personnel Commission (OTEPC) estimated that 68% of the country's basic education teachers and 61% of vocational education teachers would retire within the next 15 years [47]. As of 2012, approximately 56% of teachers in Thailand were women: 60% in primary education and 51% in secondary education. Understanding the differences in the demographic variables among teachers and their association to the level of learning readiness for PD in cloud computing is important, first for the benefit of the current effort in promoting cloud computing in basic education, secondly, because, mistakenly, trainers generally assume that the group of people attending the training event is homogenous. Since cloud computing is new in education sector, bringing change in technology, media, information, and learning behaviours, trainees preparedness for this innovation might influenced by age, gender and past experience on training. Thus, this paper will like to address the following research questions:

1. Do male and female teachers differ significantly in the level of learning readiness for PD in GAFE?
2. Do teachers' age demarcations differ significantly to their level of learning readiness for PD in GAFE?
3. Do teachers' number of past GAFE training attendance differ to their level of learning readiness for PD in GAFE?

3. METHODOLOGY

All high and vocational schools teachers participating in 5 days training on Google Apps for Education (GAFE) at four training points in Thailand were invited to complete an online Learning Transfer System Inventory (LTSI) questionnaire. The LTSI was developed by Holton and Bates (1997) to assess learning and transfer through two construct domains of actual training event-program specific and at a general training level that denotes organizational factors that may influence any training program being conducted. LTSI questions are constructed using a Likert-type scale ranging from 1 (Strongly Disagree) to 5 (Strongly Agree). The latest version (version 3) of this instrument is used in this study composed of 54 questions which took approximately 30 minutes to complete.

As part of this study only the construct on learning readiness, gender, age and past training experience were considered out of the 16 constructs that make up the LTSI instrument. The questions measuring learning readiness were assessing the four aspect of the construct including the teachers (1) understanding of how training content will affect the performance (2) understanding about job related developments (3) expectations from training and (4) expected outcomes at the beginning of the training [48]. The demographic variable were derived from the questions related to age, gender and how many times have you attended the same type of training content in the past 12 months.

Data collected, were screened for possible outliers and unengaged respondents. In order to see the cumulative impact of the independent variables on the dependent variable, the authors decide first of all to run a multiple linear regressions step by step .In the first regression model, the variables age, gender and past training experience direct effect on learning readiness was stimulated. Next, the interactions effects among the independent variables were added one at the time to observe the change in variance on the dependent variable. We considered the subgroups within each independent variable. For instance, age variable was group into 6 subgroups and coded 0, 1, 2,3,4,5 for teachers under 26, 26-35, 36-45, 46-55, 56-65, and more than 65 years old respectively. Past training attendance was also considered as categorical variable in this cases with six subgroups and code 1,2,3,4,5,6 for 1 time, 2 times, 3 times, 4 times, 5 times and 6 times attendance. Male was code 1 and female

2. The internal consistency of the learning readiness items had a Cronbach Alpha value of (α= .81) which demonstrate a higher internal consistency.

By default, the first subgroup of every predicting variable was set as the referent group by the STATA software use for the analysis of the data. Since quantitative analysis are expressed in term of magnitude, direction and statistical significance of association, we organized our results accordingly. Thus, we consider from our regression outputs table, results that were statically significant, then we group them in two list of positive and negative association. Finally we analyse the change in R-square.

Paired sample test was conducted to evaluate whether there's any significant difference between the means of the learning readiness of (1) males and females; (2) younger (under 35 years) and older (above 35years) respondents; and (3) one time and multiple time attendees, we group each independents variables in two groups. That is with respect with age 1=younger (under 35 years) and 2= older (above 35years), gender 1= males and 2=females, and attendance 1= one time attendance and 2= multiple times attendance.

4. RESULTS

The teachers participating in GAFE training at the end of the academic year 2016/2017 were ask by the trainers to respond to the online questionnaire design to assess the various study variables. Participants were teachers at Chagcheasao vocational college (78 respondents) located in the Center of Thailand, Nakhorn Nayork Technical College (64 respondents) East of Thailand, Mathayom Wainarong (69 respondents) Bangkok Metropolitan and Sunthorn Phu Pitiya (21respondents) East of Thailand. Thus, the total number of 232 respondents were received. However, after test of outliers, missing values and unengaged respondents, only 213 respondents were considered. From the data extracted at the different training points online registration (https://sites.google.com/a/eisth.org/eistest1/eis), a total number of 667 teachers participated in the different trainings . Therefore, return rate on our survey was approximately 34%.

The sample data was grouped into two groups – low learning readiness and high learning readiness. Respondents with low learning readiness have their cantered mean response below zero and respondents with high learning readiness have their cantered mean response above zero. Majority are females (117 or 55%). 66% and 54% of females reported low learning readiness and high learning readiness respectively (see Table 1) .In terms of age, majority of the respondents (92 or 43%) were within the "26-35 years" age bracket. Respondents over 65 years of age formed 1% of the total sample (Table 2). For training attendance, majority of the respondents (132 or 62%) were first time attendees. 69 or 59% of the first time attendees reported high learning readiness (Table 3).

Table 1. Level of learning readiness for GAFE training * teachers' gender cross tabulation

Learning readiness	Gender: Frequency (Row %)	
	Male	**Female**
Low	33(34%)	64(66%)
High	63(54%)	53(46%)
Total	**96(45%)**	**117(55%)**

Table 2. Level of learning readiness for GAFE training * teachers' age cross tabulation

Learning readiness	Age of respondents (years): Frequency (Row %)					
	Under 26	**26-35**	**36-45**	**46-55**	**56-65**	**65+**
Low	11(11%)	35(36%)	24(25%)	22(23%)	4(4%)	1(1%)
High	2(2%)	57(49%)	39(34%)	10(9%)	6(5%)	2(2%)
Total	**13(6%)**	**92(43%)**	**63(30%)**	**32(15%)**	**10(5%)**	**3(1%)**

Table 3. Level of learning readiness for GAFE training * teachers 'training attendance cross tabulation

Learning readiness	Training attendance: Frequency (Row %)	
	First time attendee	Multiple time attendee
Low	63(65%)	34(35%)
High	69(59%)	47(41%)
Total	**132(62%)**	**81(38%)**

4.1 Multiple Regression Models

4.1.1 Regression model 1

During the first part of the analysis, the independent variables age, gender and the number of past training attendance were integrated into a regression model in order to calculate the amount of variance accounted in leaning readiness. A significant regression equation was found F (11,201) =4.06, p<.000), with an R^2 of .18. Indicating that, taken as a group the independent variables predicts learning readiness for PD in cloud computing significantly. Looking at the predictors individually, first of all with respect to age, setting the reference group to be teachers below 26 years old, the regression output Table 4 shows positive coefficients from the different age levels when compare to the reference group. The coefficients across all age levels vary between 0.943 to 0.40 indicating that, teachers older than 26 years have a better learning readiness for PD in GAFE when compare to teacher under 26 years old. For instance, teachers with the age range between 26 to35 are 0.943 more ready to learn GAFE tools when compare to their peers under the age of 26 and this difference is significant at p<0.01. However, not all age level are significantly different with the reference group. Thus, we cannot conclude that teacher's age difference is significant in association to learning readiness for GAFE.

With respect to gender, the results show a negative coefficients between male teachers and female. Indicating that female teachers when compare to male are less readiness for PD in GAFE by a coefficient of -.22. This difference between female and male teachers is significant at p<0.1.

With respect to attendance. Results show a significant difference in learning readiness at p<0.05 between the group of first times attendees and teachers who have attended GAFE training 6 times.

4.1.2 Regression model 2

Keeping all the variables of the regression model 1 unchanged, A second multiple linear regression was calculated to predict teachers' learning readiness for PD in cloud computing based on age, gender, past GAFE training attendance and adding the interaction between age and gender. The regression equation remained significant F (16,196) =5.46, p<.000) with an increased in R^2 from .18 in the first model to .30. The interaction between age and gender showed that, the effect of teachers age on learning readiness for PD in cloud computing is dependent to gender. From Table 4 female teacher's age from 46 to 55, 56 to 65 and more than 65 years old have a higher learning readiness for PD in cloud computing when compare to male teachers under 26 years old.

4.1.3 Regression model 3

In Regression Model 3, the interaction between gender and attendance was added to the previous independent variables. The multiple linear regression calculated to predict learning readiness for PD in cloud computing showed a slightly difference in R^2 when compare to the regression in model 2. The regression equation showed F (19,193) =4.93, p<.000 with R^2=.33. Female teachers who have attended GAFE training multiple time have a decrease learning readiness when compared to male who are first time attendees. However this difference is not statically significant.

4.1.4 Regression model 4

In the final regression model, all predicting variables including age, gender, past GAFE attendance and all possible interactions were added. Specifically in this model, the interaction between age and attendance was added to the model. Compare to model 3 the explained variance in model 4 increased to R^2=.41 with the regression equation F (27,185) =4.82, p<.000. The increased in the explained variance of learning readiness for PD in Cloud computing is due to the inclusion of the interaction between age and attendance. In this regression model the results showed that Thai's teachers from the age of 56 onward have negative coefficient when compared to younger teachers under 26. This indicate that younger teachers (under 26) have higher learning readiness for PD when compare to teachers above 56 year old.

Table 4. Multiple regression models output

Predictor variables	Dependent variable: Learning readiness (LR)							
	(1)		(2)		(3)		(4)	
	Coef(b)	*Beta(β)*	*Coef(b)*	*Beta(β)*	*Coef(b)*	*Beta(β)*	*Coef(b)*	*Beta(β)*
Age Group								
1	0.943***	0.572	0.561	0.340	0.575	0.349	0.607	0.368
2	0.925***	0.517	0.395	0.221	0.453	0.253	0.483	0.270
3	0.401	0.175	-0.566	-0.248	-0.401	-0.176	-0.367	-0.160
4	0.600*	0.155	-0.750	-0.194	-0.743	-0.193	-1.667***	-0.432
5	0.563	0.081	-1.667**	-0.240	-1.667**	-0.240	-1.667**	-0.240
Gender								
Female	-0.222*	-0.135	-0.991**	-0.604	-0.995**	-0.606	-1.133***	-0.812
Attendance								
2	0.145	0.069	0.233*	0.110	-0.207	-0.098	-0.731	-0.346
3	-0.108	-0.034	-0.326	-0.102	-0.575	-0.180	-1.289**	-0.404
4	0.230	0.067	0.131	0.038	0.195	0.057	-0.150	-0.044
5	0.302	0.070	0.472	0.110	0.461	0.107	2.000***	0.466
6	0.847**	0.172	0.956***	0.194	0.976***	0.198	2.667***	0.540
Gender#Age								
2 1			0.405	0.207	0.333	0.170	0.657	0.336
2 2			0.658	0.302	0.575	0.264	0.905*	0.416
2 3			1.617***	0.522	1.391**	0.449	1.848***	0.596
2 4			2.181***	0.404	2.115***	0.392	3.444***	0.639
2 5			3.208***	0.379	3.132***	0.370	3.667***	0.433
Gender #Attendance								
2 2					0.600*	0.252	0.731	0.307
2 3					0.398	0.108	0.759	0.206
2 6					-0.340	-0.049	-0.017	-0.002
Age #Attendance								
1 2							0.247	0.077
1 3							0.681	0.159
1 4							0.448	0.098
1 5							-1.940***	-0.360
2 2							0.581	0.182
2 6							-2.389***	-0.397
3 2							0.431	0.087
4 2							0.222	0.026
Constant	3.092		3.667		3.667		3.667	
Observations	213		213		213		213	
Prob>F	**0.000**		**0.000**		**0.000**		**0.000**	
R^2	0.182		0.308		0.327		0.413	
Adjusted R^2	**0.137**		**0.252**		**0.260**		**0.327**	

*Notes: *p<0.1; **; ***p<0.01; Gender (male=1, female=2); Age group (under 25 years =0; 26-35=1; 36-45=2; 46-55=3; 56-65=4; 65+ years=5); for each factor variable, the first category was the base category.*

4.2 Paired SAMPLE t test

A paired-sample t test was conducted to evaluate whether there's any significant difference between the means of learning readiness of (1) males and females; (2) younger (under 35 years) and older (above 35years) respondents; and (3) one time and multiple time attendees.

The results indicated that:

- The mean learning readiness for males (M=3.95, SD=0.83) was significantly greater than the mean learning readiness for females (M=3.71, SD=0.79), t (211) =2.16, p=0.032. The 95% confidence interval for the mean difference between the two ratings was 0.02 to 0.46. Thus we conclude that the difference in means is statistically significant.
- The mean learning readiness for younger respondents (M=3.85, SD=0.81) was not significantly greater than the mean learning readiness for older respondents (M=3.78, SD=0.83), t (211) =0.68, p=0.498. The 95% confidence interval for the mean difference between the two ratings was -0.14 to 0.29. Thus we conclude that the difference in means is not statistically significantly different.
- The mean learning readiness for first time attendees (M=3.74, SD=0.85) was not significantly greater than the mean learning readiness for multiple time attendees (M=3.94, SD=0.75), t (211) =-1.72, p=0.086. The 95% confidence interval for the mean difference between the two ratings was -0.42 to 0.03. Thus we conclude that the difference in means is not statistically significantly different.

5. DISCUSSION

This study investigates the potential difference in teachers' demographic variables (age, gender and past training experience) and the association to the level of learning readiness for GAFE training in Thailand. Learning readiness indicates trainee preparedness before training in term of (1) understanding how the training program will affect job performance (2) how training content line up with individual need in term of job development (3) formulating learning expectations from training and (4) expected outcomes at the beginning of the training [49]. The objectives were to find out the teachers' level of learning readiness for PD in GAFE across (1) age demarcation (2) gender difference (3) the number of past GAFE training attendance. To our knowledge, and related to GAFE training in Thailand, this is the first study that investigates the demographics variable such as age, gender and past training experience of teachers associate to the level of learning readiness for PD in GAFE.

From the data sample of this study, result indicates a significant difference between male and female teachers in Thailand in association to the level of learning readiness for PD in GAFE training .Female teachers are less prepared for GAFE training when compare to male teachers. Since GAFE training are ICT related, this results confirms previous research findings that claimed that, compared to men, women have higher computer anxiety and lower computer self-efficacy [50,40].

Studies in sociology report that women are more expressive and tend to focus on social-oriented activities ,whereas men focus on more task-orientated activities [51,52]. Our study provides some evidence for these claims in the context of learning readiness for training in GAFE. From the training program published online (bit.ly/eis-mnu-kfn) GAFE training strategy currently used in Thailand is task oriented. Teachers are trained on how to use the different cloud tool. For instance, creating a google site, creating google classroom, using google drive. According to [53], Male and female may approach technology through different routes .Males tend to pick up technology first and then consider its application in teaching ,whereas females tend to start with their instructional needs. In other words, females put greater emphasis on pedagogy than technology, while males tend to be attracted by the technology first. Thus, female will prefer pedagogically based training where relevant tools of GAFE are presented. Female teachers will be more comfortable learning the use of this tools in more social environment. For example, Instead of every teachers working on his own computer during the training, a group work in using the GAFE tool will be more rewarding for female teachers. Therefore we recommend that professional development in relation with GAFE for females should involve more showcases and interactions while training for males would be more appropriate when it provides many hands-on activities.

The interaction between gender and age shows that the gender effect on learning readiness for PD in GAFE training depend upon the age of the teachers. In another words, the effect of gender on learning readiness depend on whether the teacher belong to a certain age group. From our multiple regression output model 4, Female teachers that are above 36 years old have a higher learning readiness for GAFE training when compare to younger male teachers under 26. The possible explanation about this result is

that, because Thai's teachers' promotions in the education sector is based on the years of experience, senior female teacher hold high positions in schools, they are among the leading team to bring change in education system. Therefore, they are pressurised to lead by example in using these new tools. According to [54], seniors are very respected in Thailand and they are often considered as expert. Thus, seniors' female teachers will be more invested in acquiring new skill because of their position as leader in school. This result is in line with the findings from the study on teacher's attitude towards professional development activities which claimed that female teachers have more positive attitude and readiness in training [30,39]. However, it contradicts the assertion made by Prensky, (2001) that older teachers are less efficient in ICT. This finding put emphasis on the previous recommendation. Given the fact that female teachers are the majority in term of number, and as they hold higher position within the school institution compared to man, the success of PD in GAFE and its implementation should consider the gender of the trainees at the planning stage.

With respect to age, and according to the Socio-emotional Selectivity (SST) Theory, teacher's interest to learn innovation such as GAFE will decrease when age increase. The regression model 4 supported this assertion. Comparing teachers under 26 years (reference group) to the different age groups, the output coefficients are 0.67,0.48,-0.37,-1.7,-1.7 for teachers between the age of 26-35,36-45,46-55,56-65 and more than 65 respectively. This data show that, as the age of the teachers increase they show less interest in learning. However, this difference are not statistically significant. Similarly, in order to run the paired sample t-test, the variable age was dichotomised as old and young for, the mean learning readiness for younger respondents (M=3.85, SD=0.81) was not significantly greater than the mean learning readiness for older respondents (M=3.78, SD=0.83), t (211) =0.68, p=0.498. The 95% confidence interval for the mean difference between the two ratings was -0.14 to 0.29. Thus, we conclude that the difference in means is not statistically significantly different. Thus, we cannot conclude that senior's teachers in Thailand are less ready for PD in GAFE. These results are in line several studies who have argued that age difference is not significant for learning or using ICT [55,34,35].

When comparing first time attendees to GAFE training to multiple time attendees, we found that the difference in the two subgroups was significant for the first time attendees and 6th time attendees. Thus it was only after 5 times attendance that teacher's perception of readiness for GAFE training was completely different to first time attendee's perception. First time attendees display a low learning readiness when compared to multiple time attendees. This is in line with the arguments suggested by Holton et al. (2003) stating that learning readiness of trainees was to some degree shaped by the trainee's perception of how the organization will react to the trainee's application of training on the Job. If trainees expected resistance to change, lack of supervisor support, or received negative personal outcomes from previous attempts to apply training, then the level of readiness for future training is less positive [56,57].

6. CONCLUSION

Cloud computing is becoming increasingly popular as a way to teach, collaborate, and build virtual classrooms in education sector. Teachers and school institutions are the first line of adoption of this innovation. In order to integrate cloud computing in their classrooms, teachers must be prepared physically and psychologically. Particularly, teachers must understand how clouds tools like GAFE will change their teaching performance. Results from this study indicate that the demographic variables age, gender and teachers' past experience in training are associated to the level of learning readiness at least for GAFE training. As todays' education sector is going through multiple reforms mostly due to the advance in ICT, the demographic variables should be considered in the strategic planning and implementation of these innovations. For example, because of the significant difference in learning ICT between male and female teachers, training program for GAFE should involve more showcases and interactions rather than being essentially task-oriented. In addition, training planners, educational administrators must communicate long in advance with the teachers regarding the training activity and how the training content will affect their performance.

7. LIMITATIONS

Some limitation might be related to collecting data and interpreting results. A first limitation might be the omission of important variables. For

example, additional elements that can influence the level of learning readiness such as trainee's cognitive ability, locus of control, job involvement and organizational learning culture could be added as additional antecedents of learning readiness.

Another potential shortcoming in the study is common method bias. We used one single questionnaire to measure all constructs included, so perhaps the strength of the association between these constructs may be somewhat inflated. However, all our variables were categorical and does not vary with time.

A third potential limitation is related to the measurement of learning readiness. The true meaning of learning readiness may only be partially captured due to the limitation of LTSI instrument used and given that learning readiness measure was based on self- reports. The confidence in our results could be strengthened with inclusion of other personal factors in LTSI instrument including positive personal outcomes, negative personal outcomes, perceive self-efficacy, personal capacity to transfer and transfer effort performance expectation . It would then be possible to look at learning readiness in a holistic way and see how these factors act on teachers' readiness for professional development. These recognized shortcomings could inspire researchers to define their future research agendas.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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