SOUTHEAST ASIAN JOURNAL OF SCIENCE AND TECHNOLOGY

Volume 4, Issue 1, 2019
P-ISSN: 2672-2984
E-ISSN: 2672-2992
www.sajst.org

Relationship of Perceived Trust and Perceived Ease of Use on Adoption of Computer Aided Learning in the Context of Sri Lankan International Schools

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Abstract – *Current research examines the relationship of perceived ease of use and perceived trust on adopting computer aided learning in Sri Lankan context. Sample was drawn out of the students pertinent to the branches of three private international schools operating in Sri Lanka. In the very beginning, 500 questionnaires were distributed and ultimately 305 duly completed questionnaires were considered for the final data analysis. Contributory factors towards perceived trust were identified by conducting principal component analysis. TAM has been extended by using the perceived trust variable. Correlation analysis followed by multiple regression analysis using hierarchical method along with diagnosis tests for outliers, residuals, influential cases, were performed whilst supplementary statistical tests, such as trend analysis and contrast test of ANOVA have also been used for further analysis of demographic characteristics. Empirical evidences supported two hypotheses indicating the positive relationships of perceived trust and perceived ease of use variables towards adopting computer aided learning. Besides, it was revealed that there are differences between demographic variables. Third hypothesis asserting the existence of differences in adoption of computer aided learning between lower usage user category and higher usage category was also supported. Restricted sample selection owing to time restrictions are limitations. Nevertheless, extending the TAM in relation to present research context could be noted as the originality of the research alongside the identification and selection of perceived trust factors. Findings would be beneficial for e-learning service providers, school officials, students and education policy makers, the same. In conclusion, future researches could be performed in varied contexts in the field of technology adoption in search of diverse findings.*

Keywords – *Computer aided learning, demographic variables, international schools, PCA, perceived trust*

INTRODUCTION

Commitment of Sri Lankan authorities towards policy making and reforms on education has demonstrated by developing a medium-term education strategic plan for the period of 2018 to 2025, whilst articulating a national policy for the areas of science, technology, engineering and mathematics (STEM) education, parallel to the policy agenda of the government. Simultaneously, significant involvement has shown by non-state institutions in education services as indicated by the number of private schools, international schools and 'pirivenas'. Policy makers have taken necessary initiatives in order to inaugurate a pilot project on digital classrooms, concurrently with internet facilitated education while designing the ICT education master plan (CBSL, 2018). Sri Lanka Prosperity Index (SLPI), which has three sub-indices, namely 'Economy and Business Climate', 'Well-being of the People' and 'Socio-Economic Infrastructure' has been increased in 2018 in comparison to the previous year amidst challenging political and economic environment. Economy and Business Climate sub-index has improved primarily due to price stability and increase in informal sector wages during the year. With regard to the sub-index of Well-being of the people; major improvements were recorded in the aspect of quality of education, among other dominant factors in the respective sub index. Socio-Economic infrastructure sub-index is also increased slightly during the year mainly due to

Volume 4, Issue 1, 2019
P-ISSN: 2672-2984
E-ISSN: 2672-2992
www.sajst.org

the improvement in information and communication technology (ICT) facilities, *inter alia* (Statistics Department, CBSL, 2019). In view of the above facts it is obvious that, there is a potential for development of electronically facilitated education, particularly in computer aided learning, even though the literacy rate is high in Sri Lanka, enabling to enhance the acceptance of novel learning experience for both students and teachers.

OBJECTIVES OF THE STUDY

Primarily it was postulated for the identification of the relationship of perceived ease of use (PEOU) and perceived trust (PT) on adoption of computer aided learning (ACAL). Secondly, intended to examine the differences/similarities in ACAL between lower usage user category and higher usage categories.

MATERIALS AND METHODS

Primarily qualitative data were collected and operationalized in a way that enables the facts to be measured qualitatively and attempted to generalize the research findings by utilizing appropriate samples, following reductionism, structured methodology and being the researcher independent of what is being observed in the study. Hence, deductive methodology and quantitative method has been used. Respondents of this present research study were the students of the branches of three private international schools operating in Sri Lanka. Respondents were selected upon multi-level cluster sampling method as per provinces/districts and major cities in which these international schools are in operation. Enumerators of data collection process of this research have collected data through self-administered questionnaires from the respective respondents. Overall, 500 questionnaires were distributed and 305 duly completed questionnaires were considered for the final data analysis of this study. TAM has been extended by using the perceived trust variable. Contributing factors towards perceived trust were identified by conducting principal component analysis. Correlation analysis, multiple regression analysis using hierarchical method along with diagnosis tests for outliers, residuals, influential cases, were performed in conjunction with supplementary statistical tests, such as trend analysis and contrast test of ANOVA have also been used for further analysis of demographic characteristics.

Conceptual Framework

Theory of reasoned action (TRA) introduced by Ajzen and Fishbein has been later extended and become widely accepted as technology acceptance model (TAM). Davis's TAM (Davis, 1989; Davis, Bagozzi, & Warshaw, 1989) is applied extensively to understand user adoption and usage of technology (Venkatesh, 2000). TAM was developed by Davis, F and Bagozzi, R (Davis 1989; Bagozzi, Davis & Warshaw 1992). TAM is an adaptation of TRA for the field of information systems. Various exercises to extend TAM have generally led largely by one of the following 3 approaches: by integrating factors from interconnected models on customer adoption, by means of assimilating additional or alternative belief factors, and lastly by adapting antecedents and moderators of PU and PEOU variables. Based on this discussion and review of literature following conceptual model was formulated for the study.

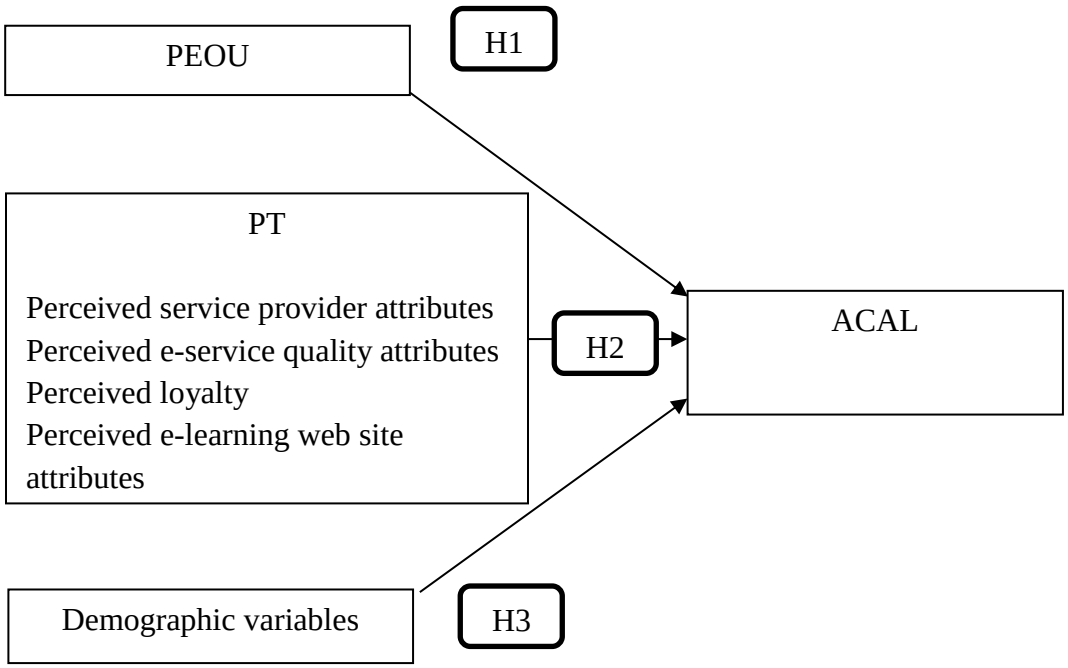
Hypotheses of the Study

The results of a research revealed that perceived usefulness (PU), perceived ease of use (PEOU), subjective norms (SN), and quality of work life (QWL) positively affect students' behavioural intention (BI) on the adoption of e-learning systems in Qatar and USA (El-Masri & Tarhini, 2017). The effects of the commonly used external factors on TAM's two main constructs, Perceived Ease of Use (PEOU) and Perceived Usefulness (PU), have been studied across a range of e-learning technology types and e-learning user types by developing a General Extended Technology Acceptance Model for E-Learning (GETAMEL), (Abdullah & Ward, 2016). Effect of PEOU towards behavioural intention to use e-learning studied using The General Extended Technology Acceptance Model for E-learning approach from the country perspective of Azerbaijan (Chang et al., 2017). Similarly, TAM's variables have been used in other e-services related researches as well (Gayan Nayanajith, 2019; Nayanajith & Damunupola, 2019a & 2019b). PEOU also being used in identifying the factors affecting private university students' intention to adopt e-learning system in Bangladesh (Amin et al., 2016; Nayanajith et al.,

Volume 4, Issue 1, 2019
P-ISSN: 2672-2984
E-ISSN: 2672-2992
www.sajst.org

2019). Considering the aforesaid facts following hypothesis is proposed,

Figure 1: Conceptual model



$H_1$1-There is a positive relationship of PEOU and ACAL

Learners' views on trust-based e-assessment system for online and blended environments have been examined by researchers (Okada et al., 2017). A model was proposed intending to managing the formation and the evolution of e-learning classes based on information available on online social networks combining skills, interactions, and trust relationships, which are properly combined in a unique measure (De Meo et al., 2017). Innovativeness and trust were found not to affect significantly towards the E-learning system acceptance (Salloum et al., 2019). Behavioral intention (BI) on e-learning adoption, was significantly influenced by performance expectancy, social influence, habit, hedonic motivation, self-efficacy, effort expectancy and trust (Tarhini et al., 2017). Perceived trust of e-services has been researched in relation to different service sectors as well (Gayan Nayanajith & Damunupola, 2019; Gayan Nayanajith & Dissanayake, 2019). Trajectory of trust factors is presented in a Grounded Theory narrative, in relation to academics' e-learning adoption in higher education institutions (Martins & Baptista Nunes, 2016). In view of the aforementioned facts following hypothesis is proposed,

$H_1$2-There is a positive relationship of PT and ACAL

Moderating effects of age, education level, gender, experience on e-learning usage intention have been researched related to the adoption of e-learning systems in Qatar and USA (El-Masri & Tarhini, 2017). In addition, individual differences-namely, age, gender, and experience are hypothesized to moderate the effects of the constructs on behavioral intention and technology use, in search of the effects of cultural dimensions and demographic characteristics on e-learning acceptance (Tarhini, 2016). An analysis based on demographic data revealed several subgroups of students, the perception of usefulness was influenced by different aspects (Aristovnik, et al., 2016). Another paper has presented the results of a survey of the social and demographic characteristics of university students

SOUTHEAST ASIAN JOURNAL OF SCIENCE AND TECHNOLOGY

Volume 4, Issue 1, 2019
P-ISSN: 2672-2984
E-ISSN: 2672-2992
www.sajst.org

involved in distance education (Karpenko et al., 2017). In consideration of the aforementioned facts, following hypothesis is proposed,

$H_1$3-There is a difference in ACAL between lower usage user category and higher usage user categories

RESULTS AND DISCUSSION

Data analysis was completed using IBM SPSS 20 package. The demographic characteristics of the population are being replicated largely by the designated sample of the research study. Since the PT is a latent variable, principle component analysis (PCA) was conducted at the very beginning. PCA was initially conducted on the 24 items of PT with orthogonal rotation (varimax). The Kaiser–Meyer–Olkin (KMO) measure tested the sampling adequacy for the analysis, KMO = .91 ('superb' as stated by Field, 2009) and all KMO values for individual items were > .7. Bartlett's test of sphericity χ^2, $p < .001$, indicated that correlations between items were sufficiently large for PCA. An initial analysis was run to obtain eigenvalues for each component in the data. Four components had eigenvalues over Kaiser's criterion of 1 and in combination explained 50.80% of the variance. Scree plot was somewhat ambiguous and showed inflexions that would justify retaining both components 2 and also 4. Referring to the sample size, and the convergence of the scree plot and Kaiser's criterion on four components, 4 components were retained. Table 1a shows the factor loadings after rotation. The items that gather on the same components suggested that component one represents perceived service provider attributes (PSPA), component two perceived E-SQ attributes (PESQA), component three perceived loyalty (PL) and component four perceived e-learning website attributes (PELWA).

Table 1a-PCA results of PT items (*N*=305)

	Rotated factor loading			
Item	PSPA	PESQA	PL	PELWA
I believe that service provider is a large company	.82			
I believe that service provider is one of the largest in the industry	.70			
I believe that service provider handles large no. of programs per day	.67			
I believe that service provider facilitates large no. of inquiries per day	.66			
I believe that service provider has a good reputation	.63			
I believe that service provider has a good reputation amongst students/users	.61			
I believe that service provider is trustworthy	.58			
I believe that service provider is customer oriented	.55			
I am able to access the computer aided learning (CAL) website quickly		.79		
I am able to quickly complete modules through the web site		.75		
I am able to use the CAL utilities/related facilities, of website without much effort		.71		
The CAL website is always available for users	.63	.70		

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Volume 4, Issue 1, 2019
P-ISSN: 2672-2984
E-ISSN: 2672-2992
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Customer services are easily accessible		.66		
Website has the services of customer service representatives who are available online		.65		
Offers prompt responses to user requests		.59		
Quickly resolves online program issues		.57		
I am committed to programs till end			.87	
I will recommend CAL to others			.79	
I will enroll for other CAL programs in future			.74	
I believe that I have made the right choice for CAL			.71	
There is a sound process for CAL user authentication related to log in				.73
There is a sound process for CAL user authentication related to CAL courses				.68
Handles personal and user's program data confidentially				.65
Upholds secrecy of user credentials				.61
Eigen values	7.32	1.91	1.32	1.24
Percentage of variance	31.30	7.91	5.82	5.77

Note: Only the factor loadings over 0.5 given in the table

Reliability analysis was conducted to measure internal consistencies of the total scores for each scale through Cronbach's alpha coefficients. The figures of reliability measurements are presented in table 1b. As per the findings, all the reliabilities for three variables-PT, PEOU and ACAL are found to be adequate since Cronbach's alpha values are higher than 0.7 (George & Mallery, 2003).

Table 1b-Reliability analysis

	No. of items	Cronbach's alpha	Mean	Standard deviation
PEOU	10	.962	4.45	.44
PT	24	.988	3.78	.63
ACAL	6	.883	4.38	.56

All the composite means of the three variables are at high level as the composite mean figures are all above 3.66 (where 5 point Lickert scale figures starting from strongly agree, agree, not sure, disagree and strongly disagree, have been converted to high, medium and low values in the following manner, 1-2.33, low; 2.34-3.66, medium; 3.67-5, high, respectively). Composite mean of the PEOU variable was 4.45. There were six constructs for the PT and subsequently the composite mean was recorded at 3.78 while the dependent variable; ACAL has reported a mean of 4.38.

Pearson correlation analysis was performed in order to determine the relationship between ACAL with two independent variables and correlation matrix of the variables, is presented in table 2. Results of the analysis revealed that the ACAL possesses a positive relationship with both PT and PEOU variables whilst both the relationships were significant at .01 level (1-tailed). The highest correlation coefficient figure (r = .916) was reported between ACAL and PEOU variables. Result denotes that in order to improve the degree of ACAL, it is vital to focus attention and promote PEOU and PT

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P-ISSN: 2672-2984
E-ISSN: 2672-2992
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characteristics/components as identified in PCA. Furthermore, findings reinstated that both the directional hypotheses are supported by empirical evidence and could be established that the ACAL is positively correlated with both the PEOU and PT characteristics in the context of private international school chains operating in Sri Lanka.

Table 2-Correlation matrix

	ACAL	PT	PEOU
ACAL			
PT	1		
PEOU	.873**	1	
	.916**	.845**	1

A multiple regression analysis was conducted using "hierarchical method-each set of summary statistics is repeated at each stage of the hierarchy" to predict the degree to which independent variables; PEOU and PT impact the ACAL (Table 3a & Table 3b). In accordance with model 1 (Table 3a), the overall variance of ACAL explained by PT is 76.2% as per the adjusted R square figure. According to the significance value, model 1 is statistically significant.

Table 3a-Regression output and coefficients

	t	*Sig.*	*β*	*F* Change	*df*	*Sig. F* Change	Adj. R^2
Model 1				974.68	1	.000	.762
(Constant)	27.74	.000	2.110				
PT	31.22	.000	0.620				

Dependent variable: ACAL
Predictors: (Constant), PT

In accordance with model 2 (Table 3b), the overall variance of ACAL explained by PT and PEOU is 87.2% as per the adjusted R square figure. According to the significance value, model 2 is also statistically significant. As the beta values and t statistics imply, considering the strength of the influence of each independent variable on ACAL, the PEOU dimension is the largest contributor with 16.22 *t* and .496 beta coefficient statistics, respectively. Furthermore, it is evident that both PEOU and PT variables positively influence the ACAL given the positive beta coefficient values and significance of same. Improvement from the model 1 to model 2 can be seen while observing the *F* change and R^2 change with the addition of PEOU variable in addition to PT variable. For the model 1 *F* change is 974.68 and for the model 2 it is 262.99 in which both are significant. Similarly, explanation of ACAL only by PT was 76.3% and with the addition of PEOU variable same has been increased to 87.3% reporting an R^2 change of 11%.

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P-ISSN: 2672-2984
E-ISSN: 2672-2992
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Table 3b-Regression output and coefficients

	t	*Sig.*	*β*	*F* Change	*df*	*Sig. F* Change	Adj. R^2
Model 2				262.99	1	.000	.872
(Constant)	18.39	.000	1.343				
PT	09.09	.000	0.247				
PEOU	16.22	.000	0.496				

Dependent variable: ACAL
Predictors: (Constant), PT, PEOU

VIF and Tolerance values recorded as 3.498 and .286 which are well below 10 and above 0.2 subsequently; therefore, it could be safely concluded that there is no collinearity within the data. Even the average VIF which is also 3.498 is not substantially > 1 which also shows that there is no cause for concern. In order to determine the cases which are influencing the regression model, case-wise diagnostics were checked where any case (standardized residual) with Z value above/below +/-3.29 was not found which could have been an outlier. All the values of the Cook's distance also reported < 1 (case with maximum Cook's distance value is .035) indicating that there are no cases that are influencing the regression model. Also, there were no values > two times or three times the average leverage value (0.01) and all the cases are within the boundaries of 0.97 and 1.03. Mahalanobis distance, identified that if the sample is 100 with 3 predictors; crudely, values greater than 15 were problematic. However, in this study of 305 respondents with 2 predictors there were no values greater than 15 (case with maximum Mahalanobis distance value is 5.57). Further, DFBeta statistics could be examined to identify any case with a large influence on the regression parameters. An absolute value > 1 is problematic and in all the cases values lie within +/-1, which demonstrates that these cases have no undue influence over the regression parameters. Similarly, upper and lower boundaries of covariance ratio (CVR) were calculated as 1.03 and 0.97 respectively. Cases that are outside these limits could be problematic where none of the cases have been found outside the limits which cause no alarms for deviations (case with lowermost CVR reported a value of 0.9784 and case with highest CVR reported a value of 1.0282).

In order to generalize the model beyond the sample, it is necessary to check some of the assumptions of regression residuals. If the graph of standardized residuals (ZRESID) plotted against standardized predicted values of the dependent variable (ZPRED) looks like a funnel or dots have a curved shaped pattern then it may be violating the assumptions of homogeneity or linearity. In case, if the dots seem to have a pattern and are more spread out at some points on the plot than others, then there could be violation of both homogeneity of variance and linearity. Adverse situations of any of these scenarios puts the validity of the model into a question. Nevertheless, in this instance dots looked like a random array of dots which showed the normality and linearity of residuals. Furthermore, histograms looked like normally distributed and P-P plot looked like curving around a diagonal line which is supportive for generalizing the model beyond the sample. Therefore, it could be summarized that the model appears to be generalizable to the population of interest as the assumptions have been met and could be safely assumed that this model would generalize to ACAL in Sri Lankan context.

An independent t test was conducted by separating the sample into male and female users to examine whether there are differences or similarities exist amongst two gender categories of the sample. According to the independent *t* test group statistics given in Table 4, there is a difference between ACAL

Volume 4, Issue 1, 2019
P-ISSN: 2672-2984
E-ISSN: 2672-2992
www.sajst.org

among males (mean = 4.5515) and female users (mean = 4.3345). Hence, the mean value of ACAL for males is greater than their female counterparts as per the results shown in the table.

Table 4-Group statistics

	Gender	N	Mean	Std. Deviation	Std. Error Mean
ACAL	Male	165	4.5515	.4155	.0324
	Female	140	4.3345	.4508	.0381

Differences in the mean values of ACAL is statistically significant since the *P* value is < 0.5, as per table 5. Consequently, female customers' mean ACAL is comparatively < males. In order to determine the effect size, coefficient correlation could be computed using the given *t* statistic and same is calculated as .24; reporting a lower size effect on ACAL by males and females.

Table 5-Independent sample t test

	t	df	Sig. (2-tailed)
ACAL	4.371	303	.000

Illustration of relationship amongst demographic variables and ACAL is captured in Table 6a. One-way analysis of variance (ANOVA) was executed with the purpose of testing whether there are differences between age, subject categories (SC), CAL experience (CAL exp.), CAL usage and ACAL. Accordingly, it was noticed that there are significant differences exists amongst all the aforesaid demographic variables since the *P* values of all the given variables are < 0.5. Turkey post-hoc test revealed that the science subject category and highest in CAL experience category, possesses more ACAL as against other subject categories and CAL experience categories, respectively.

Table 6a-One-way ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Age	15.188	2	7.594	51.034	.000
SC	47.514	3	15.838	377.917	.000
CAL exp.	23.038	3	7.679	62.322	.000
CAL usage	36.638	2	19.319	271.499	.000

In order to examine the specific hypothesis stated as, there are differences between lower CAL usage group and higher CAL usage groups, one-way ANOVA with planned contrasts was performed. Each contrast compared two 'chunks' of variance. (A chunk can contain one or more groups.) The first contrast is normally the experimental groups vs. control group (lower CAL usage group; less than 5 hours CAL per week group versus higher CAL usage groups: middle CAL usage group – 5 hours to 10 hours CAL per week group and high CAL usage group – more than 10 hours CAL per week). To form the next contrast, took one of the chunks that contained more than one group (higher CAL usage groups) and divided it into two chunks (middle CAL usage group and high CAL usage group). Thereafter, end up with one less contrast than the number of experimental conditions. In each contrast, assigned a 'weight' to each group that is the value of the number of groups in the opposite chunk in that contrast. For a

given contrast, randomly selected one chunk, and for the groups in that chunk change their weights to be negative numbers. Results are as shown in the Table 6b and Table 6c.

There was a significant effect of CAL usage on ACAL, F (2, 302) = 271.50, $p < .05$, $\omega = .80$. Secondly, there was a significant linear trend, F (1, 302) = 508.70, $p < .01$, $\omega = .77$, indicating that as the CAL usage increases, ACAL increases proportionately. Finally, planned contrasts revealed that having a higher CAL usage significantly increased ACAL compared to having a lower CAL usage, t (302) = 23.03, $p < .05$ (1-tailed), $r = .79$, and that having a high CAL usage significantly increased ACAL compared to having a middle CAL usage, t (302) = 11.05, $p < .05$ (1-tailed), $r = .53$.

Table 6b- One-way ANOVA-Trend analysis results

		Sum of Squares	df	Mean Square	*F*	Sig.
Between Groups (Combined)		38.638	2	19.319	271.499	.000
Linear Term	Unweighted	36.198	1	36.198	508.695	.000
	Weighted	37.881	1	37.881	532.353	.000
	Deviation	.758	1	.758	10.646	.001
Quadratic Term	Unweighted	.758	1	.758	10.646	.001
	Weighted	.758	1	.758	10.646	.001
Within Groups		21.490	302	.071		
Total		60.128	304			

Table 6c-One-way ANOVA-Contrast test results

	Contrast	Value of Contrast	Std. Error	t	df	Sig.
Assume equal	1	1.8674	.08107	23.034	302	.000
variances	2	.4823	.04366	11.047	302	.000
Does not assume	1	1.8674	.07842	23.813	68.922	.000
equal variances	2	.4823	02041	23.635	197.000	.000

CONCLUSION

PCA has indicated four factors based on the author's labelling, for PT variable. ACAL has been supported by PEOU and PT variables in the context of private international school chains in Sri Lanka. Results of correlation analysis outcome noted that two aforementioned independent variables were positively correlated with ACAL. Furthermore, main contributor towards ACAL is PEOU, compared to PT. Thus, the present research is consistent with the leading theory on technology adoption; TAM. According to the regression analysis using hierarchical method, although PEOU and PT variables are dominant variables as per the study, there are other factors which were not discussed in this study that impacts the ACAL. Independent *t* test demonstrated that mean ACAL of male users is greater compared to females. Further, there are significant differences existent within most of the demographic factors as already discussed in the former section. Additionally, this study revealed that long-term CAL experienced users and users who are following subject category of science adopt CAL to a greater extent as against users with comparatively short-term CAL experience and those who follows art subject category. Finally, planned contrasts revealed that having a higher CAL usage significantly increased ACAL compared to having a lower CAL usage and that having a high CAL usage significantly improved ACAL compared to having a middle CAL usage.

Present study was performed to determine and understand the direction of relationship of perceived trust and PEOU on ACAL in private international school chains operating in Sri Lanka. The empirical evidence supported the two hypotheses demonstrating the positive relationships in between ACAL and both the PT and PEOU. Third hypothesis stating that difference in ACAL between lower CAL usage category users and higher CAL usage category was also supported, similarly. Research findings are in compliance with previous research evidence and theories related to contemporary technology adoption. Moreover, it was revealed that there are differences between demographic variables viz. age, CAL usage, subject categories, CAL experience and ACAL. Marketers of CAL service providers should capitalize awareness on PEOU and PT variables in conjunction with innovativeness, online security, privacy, managing risks and etc. to reach new customers in more profitable customer segments along with a view to convert light users to frequent users to uplift the effectiveness and performance. Research finding is useful for the CAL service providers, school officials, students and education policy makers alike. In order to build trust towards ACAL, service providers are required to pay specific attention to perceived service provider attributes, perceived E-SQ attributes, perceived loyalty and perceived e-learning website attributes and other dominant factors as well.

Sample has been restricted only to the private international school chains with branches scattered in several provinces, although there are other prominent private international schools which operate only in Colombo. Nevertheless, novelty of the research is the particular Sri Lankan private international schools' context where there are only a few studies that are available in the literature. Future researches could be performed in different country contexts and researches could be conducted on technology adoption in other fields as well.

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