Fall 11-14-2017

An Investigation into user Adoption of Personal Safety Devices in Higher Education Using the Unified Theory of Acceptance and Use of Technology (UTAUT)

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Adoption of Personal Safety Devices in Higher Education: User Acceptance Prediction Using the Unified Theory of Acceptance and Use of Technology (UTAUT)

Purpose of the Study:
Through this study, we analyzed the penetration levels and user acceptance of handheld/wearable personal safety devices, introduced by several colleges across the nation. During the study, the applicability and predictive ability of the Unified Theory of Acceptance and Use of Technology (UTAUT) model (Venkatesh, Morris, Davis & Davis, 2003) was also tested using structural equation modelling (SEM).

Background and Theoretical Framework:
Higher education campuses are supposed to be the safest places for students. However, there has been a growing concern about their security among school administrators, law enforcement officials, students, parents, and the community at large (Addington, Ruddy, Millier, and Devoe, 2002). With indiscriminate, high profile, incidences in school compounds ranging from first grade classroom in Sandy Hook to college lecture halls in Virginia Tech, the issues of school safety and mental health have been in the forefront.

In recent years, more personalized safety devices are being invented and put to use. Colleges and universities are increasingly institutionalizing such emerging technologies and mobile safety applications across the United States. However, little research has been conducted on the nature of personal safety devices acceptance and use in the context of educational institutions. Moreover, despite the overwhelming promises these safety devices offer, colleges and universities are confronted with finding creative ways to encourage students to use these systems in a large scale (Horvath & Pisciotta 2015). On the other hand, the Unified Theory of Acceptance and Use of Technology (UTAUT) developed by Venkatesh et'al (2003) explains user intentions to use an information system and subsequent usage behavior. UTAUT is considered a relatively robust theoretical model for explaining technology adoption and use.

Methodology
The instrument used to collect the data for the study was a publicly available UTAUT questionnaire with a slight modification by these researchers. Data was collected electronically, using an online data collection software called "surveymonkey." The link of the survey was sent through email to all active students of The Sage Colleges. The anonymous data was automatically entered to excel file and then converted to SPSS Amos version 24 for analysis.

Findings and Discussion

The Structural Model Fitness
The structural model for this study included six variables: Performance Expectancy (PE), Effort Expectancy (EE), Social Influence (SI), Facilitating Conditions (FC), Trusting Beliefs(TB) and Intention to Use (IU). Most of the indices reported in the table include those suggested by Kline (2005); Boomsma (2000); and further supported by Hooper, Coughlan , and Mullen (2008) that "These indices have been chosen over other indices as they have been found to be the most insensitive to sample size, model misspecification and parameter estimates. "As seen in (*Appendix*

1), all the indices met the acceptable threshold of their respective fit indices, confirming the overall fitness of the model with the collected data.

Analysis of Path

According to result of the SEM analysis (see Appendix 2), the SEM index indicates that 65% of the variation in the dependent variable IU (Intention to Use) is explained the variation in the independent variables. While some of these independent variables directly impact the dependent variables, the impact of others is indirect. The direct and indirect impacts of each variable, along with corresponding paths is presented in Appendix 3.

Result of the SEM Analysis

The standardized regression weights of the path (see Appendix 3) presents the path toward the two endogenous variables (IU and TB) along with regression weights. Four variables directly impact IU with a statistically significant result of $p<.005$. The level of impact of these variables from highest to lowest estimate (β) of these variables are TB (.420) , PE (.231), SI (.192), and FC (124). In addition, three variables directly impacted TB with a statistically significant result of $p<.001$ each. The impact of these variables from the highest to the lowest estimate (β) are PE(.470), FC (.229) and EE (.187). The standardized direct and indirect impacts on IU (see Appendix 4) summarizes the direct and indirect impacts of the proposed variables on Intention to Use (IU). Supporting all the seven hypotheses, Intention to Use the Peace of Mind (POM) is influenced by all the proposed variables.

In sum, The Sage Colleges students' intention to use to use POM device is dependent up on to the highest level by the students' expectation of the device to perform the intended task (PE=.470; $p<.001$). This is followed by the students' trust of the gadget's reliability/dependability (TB=.420; $p<.001$) and the availability of support and instruction on how to use the gadget (FC=.221; $p<.005$). The other variables that impact the student's intention to use POM significantly, although to the lesser degree are influences by social circles (SI=.192; $p<.001$) and the effort by students to learn and familiarize themselves with the device (EE=.079; $p<.001$).

Practical and Theoretical Implications

The findings presented tangible benefits to all stakeholders including but not limited to students, parents, administrators & research bodies, for promoting safer knowledge environments; which was our ultimate goal.

- The outcomes proved vital for evaluating end-user satisfaction, a definitive measure of success, especially in unexplored environments such as higher education institutions.

- Return on investment (ROI) in IT can be measured in broader terms (Cresswell, Burke & Pardo, 2006). The findings can be utilized in conducting ROI analysis, where cost and return is measured in terms of number of incidents where POM devices were lifesaving.

- Applicability, adoption and usage are critical factors for personal safety device manufacturers. Clearly, they want to produce saleable products. Therefore, this effort and customer feedback would help in profit viability decisions.

- Other key factors reveal that students put trust in the gadget's reliability and availability of support and training to use the device.

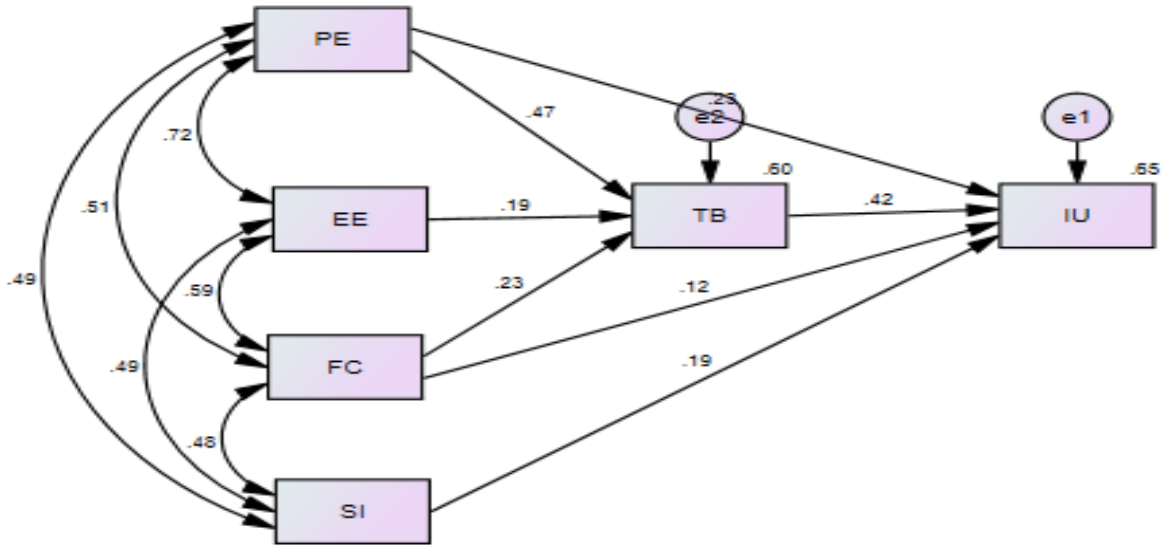
- User acceptance of personal safety devices in higher education is not studied in this manner before; therefore, it adds to the literature for such studies and may even present an alternate model to conduct both explanatory and confirmatory studies.

Appendices

Appendix 1:
Model fit Indices

Index	**Value in this model**	**Acceptable Threshold Levels**
CMIN (χ2)	p=.062 ; (x^2 =5.558, df=2)	p>.05
CMIN (χ2)/DF	2.779	<5 (Schumaker &Lomax, 2004)
RMSEA (Root Mean Square Error of Approximation)	0.066	<.07 (Steiger, 2007)
CFI (Comparative Fit Index)	.997	>.95
RFI	.955	>.95

Appendix 2:
Result of the SEM Analysis



Appendix 3:
Standardized Regression Weights of the path

	Path		β (Estimate)	S.E.	P
IU	<---	PE	.231	.053	.000
IU	<---	FC	.124	.048	.002
IU	<---	TB	.420	.053	.000
IU	<---	SI	.192	.044	.000

	Path		β (Estimate)	S.E.	P
TB	<---	EE	.187	.053	.000
TB	<---	PE	.470	.051	.000
TB	<---	FC	.229	.046	.002

Appendix 4:

Standardized Direct and Indirect Impacts on IU

Variables	Direct	Indirect (through TB)	Total
PE	.231	.197	.470
TB	.420	.000	.420
FC	.124	.096	.221
SI	.192	.000	.192
EE	.000	.079	.079

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