
PSYCHOMETRIC PROPERTIES OF AN AFFECTIVE LEARNING QUESTIONNAIRE

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ABSTRACT

Mainly there were two purposes of this study. One was to examine the extent of Facebook use in distance learning, constituted meaningful and interpretable dimensions of the affective learning construct, and to test the adequacy of the construct in terms of its reliability, convergent validity, discriminant validity, and measurement invariance to the gender of students. The sample consisted of 243 Program Pensiswazahan Guru (PPG) in International Islamic University Malaysia. The data were collected using a self-reported 15-item questionnaire measuring university students' affective learning behaviors. The results of the study supported and extended the results of previous work on students' behaviors when using online platforms for distance education. The study found evidence that students' affective learning is a valid and reliable multidimensional construct, and the measurement equivalence for male and female students, and affective learning is predictive variable for other constructs in the study. The findings are useful in making decisions in choosing and developing instructional interventions to facilitate learning ethically, safely and in a responsible manner in an online environment.

Key Words: Affective learning, Facebook, distance learning, Structural equation modeling, invariance, psychometric properties, confirmatory factor analysis, online learning, distance learning.

1. INTRODUCTION

1.1 Affective learning

In education-related research papers, affective learning is referred to as learning related to students' feelings or emotions (Shen, Wang & Shen, 2009). In the research by (Gano-phillips, 2009), affective learning is explained as learning that deals in students' interests, attitudes, and motivations. In most of the studies, it has been stated that affective learning increases the motivation of students (Mazer, J. P., Murphy, R. E., & Simonds, C. J., 2007; Mazer, J. P., Murphy, R. E., & Simonds, C. J., 2009; Lim, 2010). However, in these studies, motivation or empowerment of the learning process occurs due to some elements such as self-disclosure, interaction, and communication.

Distance education offers life long learning that helps people to go further in their professional careers. With the digital era and globalization, education has provided new challenges to teachers all over the world. Blended learning with computer-mediated communication such as social networks namely Facebook has become a common communication platform.

Facebook facilitates two kinds of communication behavior namely social behavior and academic behavior. Through the help of Petronio's (2003) Communication Privacy Management Theory (CPMT) and Moore, (1993), Transactional Distance Theory(TDT), communication behaviors are introduced to investigate their influences on affective learning of distance learners in International Islamic University Malaysia (IIUM) namely those students enrolled in Program Pensiswazahan Guru (PPG). The administration of PPG at IIUM has an official Facebook page set up for PPG students.

There are many challenges faced by distance learners nowadays. One of the important facts is that distance learners experience a communication gap when they learn from a distance. However, when they learn using Facebook the gap minimizes. On the other hand, Facebook facilitates a large number of social communications, since there are no strategies or guidelines for using Facebook for academic learning, there is the chance of students straying into inappropriate uses, which might result in lower academic performance.

Besides, when male and female students are studying together, in an online platform, students' communication has to be managed to make their learning fruitful. Though the present study is limited to distance learners of IIUM only, and limited communication behaviors, it is hoped that the results of this study will bridge the gaps explain in the problem statement and provide an understanding of the research trends in distance education.

1.2 Conceptual framework

The present research uses mainly two theories to underpin the research framework namely CPM theory of Petronio's and Moore's TD theory. Based on the concept that communication behavior is the way people interact, a model has been proposed to explain Petronio's communication management theory depicted as Communication Privacy management (CPM) and Moore's TDT. Affective learning based on engagement theory is the outcome of the communication behavior when learning online via Facebook. In the CPMT, Petronio, and Durham, (2008) explain about privacy boundaries and how self-disclosing takes place through these boundaries. They have five basic principles to disclose private information as shown in Table1.2. The first three principles explain self-disclosure and the fourth and fifth principles elaborate on online communication.

Table 1: Petronio&Durham(2008), self-disclosure and online communication

Theory	Principles	Extracted Factors
Communication Privacy Management Theory (CPMT)	1.Ownership and control of private information	Self-disclosure
	2.Rules for concealing and revealing	
	3. Disclosure creates a confident co-owner	
	4.Coordinating mutual privacy boundaries	Online
	5.Boundary turbulence-relationship at risk	Communication

In the field of distance education, Moore's three types of interaction (Moore, 1993) take place namely: (a) learner–content interaction, (b) learner–instructor interaction, and (c) learner-learner interaction. It is shown in Figure 1.

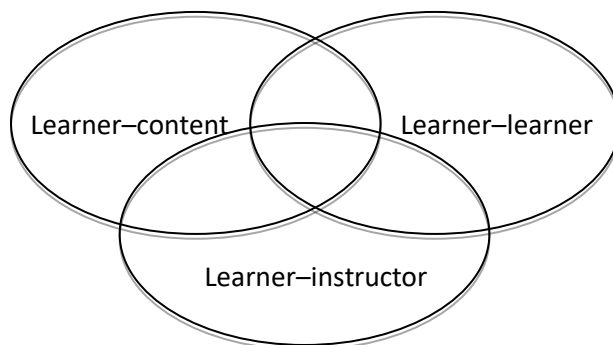


Figure 1: Moore (1993)

In the predicted model, communication behavior factors (self-disclosure and online communication) on affective learning will be investigated. Besides, three types of interactions described in Moore's transactional theory on affective learning are examined. The predicted model, with the theories by Petronio's CPMT and Moore's TDT, will be tested on the affective learning of students in online education. This is shown in Figure 2

Communication behavior Learning (communication for social interaction and learning)

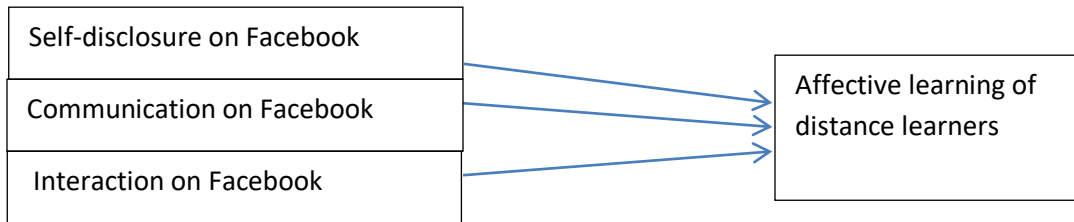


Figure 2: The predicted model of communicative behavior in affective learning.

1.3 Hypothesis

H1 Students' self-reported affective learning consists of three major interrelated factors, which are Self-disclosure on Facebook, communication on Facebook, and Interaction on Facebook.

H2 The three-factor Affective learning questionnaire is psychometrically sound in terms of reliability, convergent validity, and discriminant validity.

H3 The measurement model is an adequate measure of affective learning behavior across gender.

H4 Facebook communication, Facebook interaction, and self-disclosure on Facebook have a significant positive effect on Affective learning.

1.4 Statement of Problem

Distance learning students are facing many problems to communicate with their lecturers, peers, and University online. Studies have shown that some of the distance learners have quit and dropped out, due to the difficulties in communication (Tung, 2012; Teoh, G., Sai, B., Liao, A., Lin, W., & Belaja, K.,2013). Facebook has started to be used effectively for bridging the communication gap between students, peers, lecturers, and the University, to facilitate learning (Buus, 2012;Mikulec, 2012;Chambers, 2012; Brobst, 2013). Thus, this present research will investigate the extent of communication on Facebook among distance learners.

Students are highly distracted from the learning content available on Facebook use because of its popular social use among students. Besides, there are neither strategies nor guidelines available for using Facebook in online learning (Noh, Siraj & Ridhuan, 2013;Mugahed Al rahmi et al., 2014). Therefore, communication that contributes to learning is still an issue in the 21st

century (Mugahed Al rahmi et al., 2014). Moreover, educational studies scarcely address the issue of communication in learning. Thus, this study investigates the students' communication behavior on Facebook that contributes to learning.

Interactive communications on Facebook will enhance effective teaching during online learning. Hence, distance learners have been investigated in the context of interactions among students and lecturers (Paul & Cochran, 2013; J. Wang, 2013; Farhan, 2014; Ustati & Hassan, 2013). However relevant studies to relate students to students' communication and how they behave online are yet to be carried out. Thus, this study will provide the information on students' communication behavior in the context of self-disclosure.

1.5 Purpose of the study

This research was thus framed to measure affective learning. The construct underpinning is an essential thing to knowledge expansion in the area and a formulation of fitting strategies for affective learning among University students. This research would be directed to explore and validate the quality of the instrument that measures affective online learning on Facebook. Hence the primary goal is to construct-validate the factor structure of the questionnaire that measures affective learning behavior. Secondly, the study aimed to examine the adequacy of the construct in terms of its reliability, convergent validity, and discriminant validity. Thirdly, the study sought to provide evidence of the measurement equivalence for the male and female samples involved, which could support the prospect of a gender-invariant measure, and hence, the efficacy of the newly developed questionnaire. Lastly, the study confirms that communication on Facebook, self-disclosure on Facebook, and interaction in Facebook predict the variable affective learning.

2. METHOD

2.1 Sample

The sample consists of 243 out of 450 students who study under the PPG in IIUM. There were 81 males and 162 female in 2013. The sample size is adequate to address research objectives and fulfill the requirement of running confirmatory factor analysis (CFA).

IIUM has offered a Distance Learning Program for teachers since 2011. Technical problems in the early version of the Learning Management System have caused the lecturer to migrate the communication platform to Facebook (Ustati & Hassan, 2013; Hassan & Hashim, 2014). The administration of the PPG has also set up an official Facebook account for the PPG students to interact with the administrators.

2.2 Instrument

To collect data, the researcher used a self-reported 15-item questionnaire measuring PPG students' learning using Facebook. The items were drawn from Petronio's (2008) CPM theory and Moore (1993) Transactional distance theory and from literature mostly for the affective learning. The items were content-validated by experts prior to use in the present study. The ordering of items in the questionnaire were namely self-disclosure (4 items), communication (3

items), interaction (4 items). PPG students' self-rated affective learning on 5 response categories, that is "Strongly agree", "agree", "neutral", "disagree" and "strongly disagree".

2.3 Procedure of Data-Analysis

The study first tested two-measurement models on affective learning: a one-factor model and a three-factor model. The three-factor model was tested to establish the adequacy of the hypothesized measurement model, while the one-factor confirmatory factor analysis (CFA) aimed to validate the multidimensional nature of the constructs. The three-factor model would be compromised if the one-factor model yields a better fit. Therefore the one-factor model would be more credible (Nordin, M. S., Ahmad, T. B. T., Zubairi, A. M., Ismail, N. A. H., Rahman, A. H. A., Trayek, F. A. A., & Ibrahim, M. B., 2016). This would show an apparent effect of using a single questionnaire to collect and analyze self-reported data of what is supposed to be independent, though they are related (Nordin et al., 2016). An ill-fitting one-factor CFA of affective learning suggests the lack of threats, to the quality of the results for the three-factor model.

A CFA using the AMOS (version 21) model-fitting program was applied to validate the two measurement models of Affective learning. Preliminary assumptions such as normality and the models were estimated based on the covariance matrix derived from the data. The maximum likelihood estimation procedure was adopted to produce estimates of properties. A preliminary analysis indicated that the assumption of univariate normality was tenable (Nordin et al., 2016; Kline, 2011). Second, the adequacy of each model was assessed using the widely used standards for a good-fit CFA, which are the: (i) consistency of the measurement model with the data, and (ii) reasonableness of the parameter estimates. The analysis used the relative chi-square (χ^2/df), CFI (comparative fit index), and RMSEA (root mean square error of approximation) as the fit indexes. The CMIN/df with a value of between 2 and 5 is considered acceptable, while a CFI value close to 1 demonstrates a good fit. Finally, a value of RMSEA of .06 or less shows a reasonable error of estimation (Nordin et al., 2016)

Third, the study examined the psychometric properties of the models by assessing the components of construct validity, which are convergent validity and discriminant validity. The internal consistency of each sub-construct was measured through composite reliability (CR) and Cronbach's alpha. Besides, a multigroup analysis was conducted to ascertain that the questionnaire is gender-invariant. To test a gender-invariant measure, a two-step simultaneous analysis on both the male ($n_1 = 81$) and female ($n_2 = 162$) groups was conducted, first without constraining the factor loadings, intercepts, residual errors; the results derived a baseline Chi-square value. Second, all loadings, intercepts and residual errors were constrained to be equal in the two samples (Nordin et al., 2016)

Lastly, Affective learning on Facebook, as an endogenous construct is introduced into the three-factor model. One-sided arrows were drawn from the three factors to affective learning behavior. The one-sided arrow represents the causal effect of an endogenous construct. From Output estimates, regression weights were checked to obtain regression path coefficients and its significance based on p-value < 0.05 (Awang, 2015)

3. RESULT

Table 2 shows the descriptive statistics of the items included in the confirmatory analysis. The maximum possible score for each item is 4; the mean score of most items except for self-disclosure, distributed above the hypothetical mean of 3. The value of each Cronbach’s alpha, which is the internal consistency index of the responses to the related items, was reasonably high. The minimum value of the reliability index was .71, and it exceeded the critical cut-score of .70 for a reliable measure.

Table 2: Affective learning behavior using Facebook and item statistics

Code	Dimension/Sub-construct	Mean	SD	Alpha
Self-Disclosure				.71
SD1	I write about my spouse on Facebook	1.99	.98	
SD2	I express dissatisfaction about my lecturer on Facebook	1.53	.64	
SD3	I express my anger about my friends on Facebook	1.61	.74	
SD4	I write my view about IIUM on Facebook	2.10	1.01	
Communication				.81
FBC1	My instructor encourages me to participate in online discussion groups made on Facebook	3.67	.92	
FBC2	If I made an inquiry through Facebook message regarding any doubt about studies, the instructor will reply to me promptly	3.34	.89	
FBC3	I do not feel “lonely” or “isolated” when learning online using Facebook	3.54	.88	
Interaction				.91
FBI1	I feel that my peers are very supportive when we do an online assigned class exercise	3.89	.84	

FBI2	When we learn online, we share learning resources with our peers through Facebook	3.89	.90
FBI3	Online learning helps us to collaborate via Facebook in completing a group assignment	3.83	.93
FBI4	I always update my online class activities through my peers in Facebook	3.77	.92

3.1 Validity of Multidimensional Affective learning questionnaire

To test the validity of the Affective learning questionnaire, two confirmatory factor analyses (CFAs) were applied to the data. The results of the first CFA indicated that the one-factor structure of affective learning was inadequate to represent the data (Figure 3).

Chi-Square 300.956
 Df 77
 CFI .307
 RMSEA .110

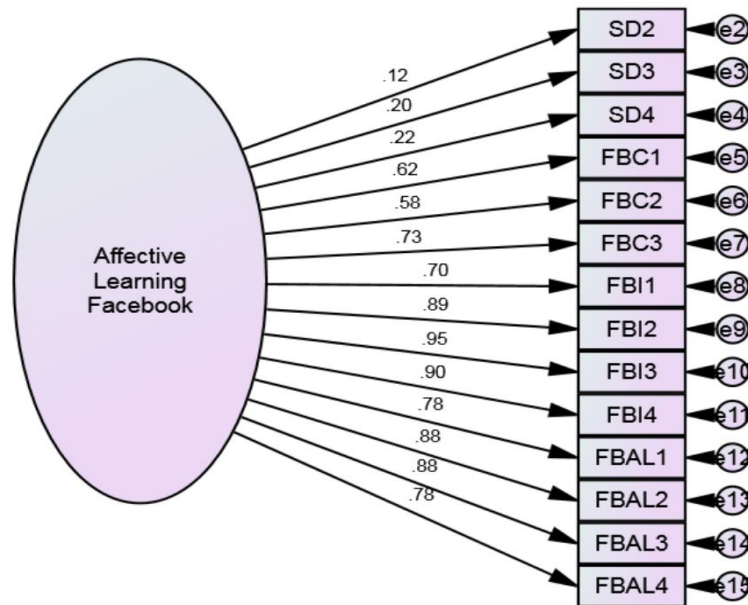


Figure 3. Results of one-factor confirmatory factor analysis

The goodness-of-fit of the model fell short of the minimum standards deemed critical for an adequate solution; $\chi^2/df = 3.908$; CFI = .307; RMSEA = .110(Figure 3). These statistics suggest that the measurement model of Affective learning on Facebook was not consistent with the data. In other words, there was no evidence to support the validity of a common factor that influences the variability of the sample's responses to the 15-item questionnaire. Furthermore, the lack of fit of the one-factor model means not a threat to the quality of the questionnaire. The second CFA, which tested the hypothesized three-factor affective learning model, yielded the expected results (Figure 4). The measurement model fitted the variance-covariance matrix; $\chi^2/df = 2.16$; CFI = .974; RMSEA = .069. All parameter estimates except the correlation between the construct, Facebook communication, and self-disclosure, Facebook interaction, and self-disclosure in Facebook were less than the cut scores reading (>.2). All other readings were substantial and statistically significant(Ahmad & Nordin, 2013).

Chi-Square 69.141
 Df 32
 CFI .974
 RMSEA .069

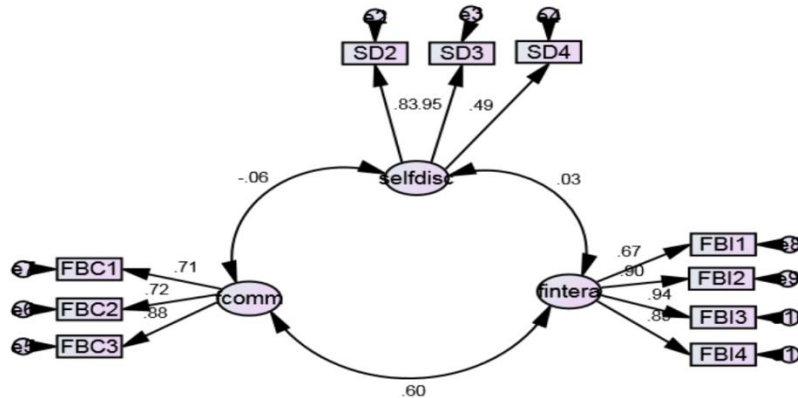


Figure 4. The results of three-factor confirmatory factor analysis

3.2 Psychometric Properties of Affective learning questionnaire

The results provide evidence to support the psychometric properties of the instrument in terms of its convergent validity and discriminant validity. The convergent validity for the measurement model is achieved when all values of the average amount of variation (AVE) exceed 0.5(Awang, 2015) as shown the Table 3. The discriminant validity is achieved when all redundant items were either deleted or constrained as “free parameter”. Discriminant validity Index summary is shown in Table 4.

Table 3: The CFA Report for every construct in the model

Construct	Item	Factor loading	AVE(minimum 0.5)	C.R(minimum 0.6)
FBcomm	FBC1	.71	0.597	0.815
	FBC2	.72		
	FBC3	.88		
Self-disc	Sd1	Deleted	0.613	0.816
	Sd2	.83		
	Sd3	.95		
	Sd4	.49		
FBintera	FBI1	.71	0.736	.917
	FBI2	.72		
	FBI3	.88		
	FBI4	.89		

Average Variance Extracted (AVE) and Composite Reliability (C.R) exceeding 0.5 and 0.6 respectively result in the reliability of the measurement model. Therefore the three-factor measurement model is reliable.

The diagonal value of table 4 is the square root of AVE of the construct while the other values are the correlations between the respective constructs. The discriminant validity for all constructs is achieved when the diagonal value (in bold) is higher than the values in its row and column. Therefore by referring to table 4, I can conclude that the discriminant validity for all three constructs is achieved.

Table 4 The Discriminant Validity Index Summary for the construct

Construct	Selfdisc	FBintera	FBcomm
FBcomm	0.773		
Self-disc	-0.062	0.783	
FBintera	0.602	0.032	0.858

Since the three-factor model has achieved construct validity ($\chi^2/df= 2.16$; CFI = .974; TLI = .963; RMSEA = .069) together with convergent and discriminant validity (Table 3 and Table 4). They are the validity requirement to claim the validity of the model. Therefore, the measurement model is valid (Awang, 2015)

3.3 Gender –invariant of Affective learning

Another objective of this study was to examine the factorial invariance of instruments across gender. The estimation of the constrained measurement model produced another Chi-square value, which was then tested against the baseline value for statistically significant differences. Finally, the change in the CFIs and the value of RMSEA of the restricted model were verified against the recutscores of .001 and .05, respectively (Nordin et al., 2016).

Table 5: Results of the gender-invariant analysis

	Unconstrained	Constrained	Change
Chi-Square	100.835	106.417	5.582
Degree of freedom	64	74	10
CFI	0.975	0.978	0.003
RMSEA	.049	0.043	0.006

The invariance test across the male and female groups resulted in a statistically insignificant change in the Chi-square value, Chi-square (df = 10) = 5.582, $p > .005$ (Table 5). In other words, the increase in the Chi-square values from the unrestricted model to the constrained model did not produce a poorer model. Though, there is a slight violation of the change value of CFI and RMSEA maintaining the value within the threshold.

3.4 Facebook communication, Facebook interaction, and self-disclosure in Facebook has a significant positive effect on Affective learning

The significant positive effect of the exogenous constructs towards the endogenous one shown in figure 6, is explained by the regression path coefficients and its significance based on p-value < 0.05. It is tabulated in table 4 (Awang, 2015)

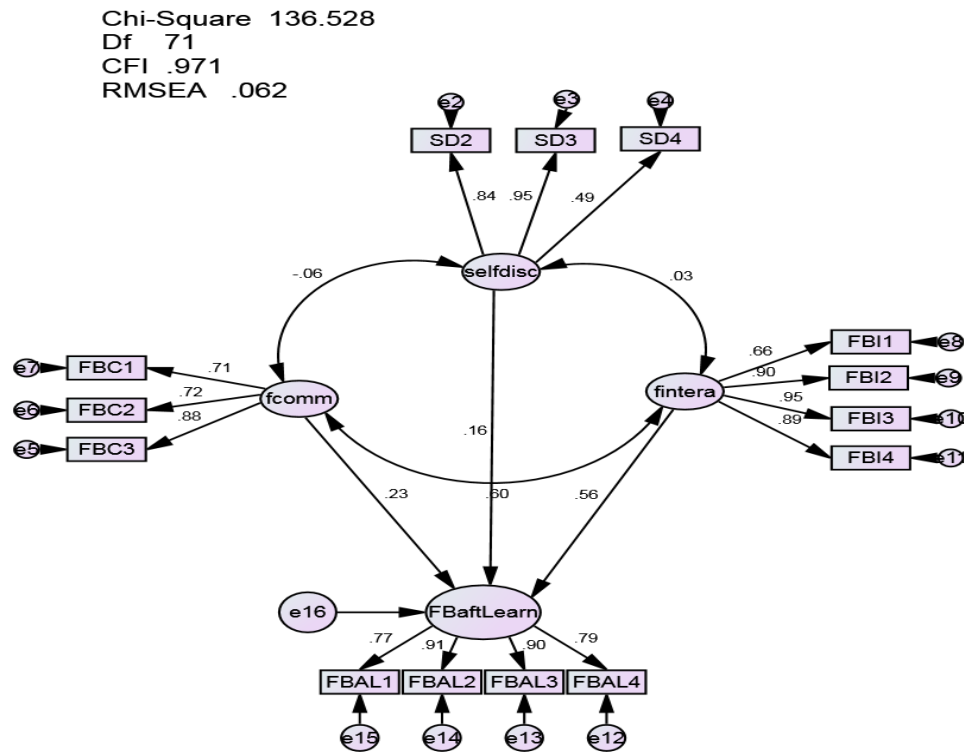


Figure 5 Affective learning as an endogenous construct

Table 6: Regression Path Coefficients and its significance based on p-value < 0.05

Construct	Construct	Estimate	S.E	C.R	P	Result
Facebook Affective learning	← Facebook Communication	.287	.090	3.201	.001	Significant
Facebook Affective learning	← Self-disclosure on Facebook	.232	.078	2.982	.003	Significant
Facebook Affective learning	← Facebook Interaction	.804	.120	6.698	***	Significant

Therefore the table 4 shows that Facebook communication, Facebook interaction, and self-disclosure in Facebook have a significant positive effect on Affective learning. The composite reliability (C.R) values for the paths are above cut score 0.6 and all path gives at significant effect at $p < 0.05$.

4. DISCUSSION

The study supported previous work on online learning platforms and extended current understanding of affective learning using Facebook. In addition to using these constructs in several ways. First, the study offers additional evidence that affective learning is in fact a multidimensional construct. The results suggest that the measurement model of affective learning behavior did generate the covariance matrix, in that it was consistent with the data. In sum, the CFA results offer evidence that supported the multifactor nature of students' self-reported questionnaire of the behavior (Nordin et al., 2016)

Affective learning comprises three dimensions, namely Facebook interaction, Facebook communication, and Self-disclosure on Facebook. Thus, it is justifiable to use the three-dimension questionnaire to systematically measure students' affective learning behaviors when using technology. These dimensions are taken from Petronio's CPM theory and Moore's TD theory (Petronio & Durham, 2008; Moore, 1993).

The second objective of this study was to assess the reliability and validity of the three dimensions. The scores from each dimension showed sufficient levels of internal consistency. The analysis showed the reliability indexes to range between $\alpha = .71$ (self-disclosure) and $\alpha = .91$ (Interaction). The data of the present study also supported the convergent validity and discriminant validity of the questionnaire. The AVE of each dimension exceeded the threshold of importance and moderate inter-correlations among the sub-constructs of online learning behavior. The current study was able to demonstrate that the 15-item questionnaire functions well in measuring students' responses to the behaviors. It is reasonable to conclude that the questionnaire satisfactorily explained the meaning and variability of a three-dimensional

behavior among students of distance learning(Nordin et al., 2016)

Thirdly, the study addressed the validity of responses across gender. The results of multiple groups CFA indicated that the measurement of affective learning behavior did not systematically vary between males and females. These results suggest that the measure of affective learning is configurable and metrically valid based on the results of the strict invariant analysis, in that the measure did not vary significantly across gender. It is justifiable than to conclude that gender was not a moderating variable; it did not interact with the underlying dimensions to influence students' responses to the affective learning questionnaire. The study had provided evidence of strong invariance of the questionnaire. The finding suggests that the measurement of the behavior applies to both male and female students, especially since the gender gap in the use of technology among male and female users has been found insubstantial (Nordin et al., 2016).

Lastly, the study confirmed the factors extracted from Petronio's CPM theory and Moore's TD theory satisfactorily predict affective learning. Since none of the three factors namely Facebook interaction, Facebook communication, and self-disclosure in Facebook fail to do so. Hence, Facebook would be a tool that helps students to avoid quitting from the online courses. As the major challenge for online learning courses is the communication gap, this study fills the gap, prevailing online students to be life long learners.

5. CONCLUSION AND RECOMMENDATION

One of the practical contributions of the study to educational practice is the usefulness of the brief 15-item affective learning questionnaires. It will be a useful tool to assess students who use Facebook to study, especially distance learning students like PPG. Policymakers, community leaders, technology leaders, and teachers can use the instrument to diagnose, the extent to which students are responsible, safe, and ethical in online learning. The use of the current questionnaire is promising in terms of facilitating future research to develop tools to evaluate and help educators and teachers in the ethical use of online learning platforms.

The study did not cover the whole spectrum of online learning behaviors. As time passes the questionnaire may be dated since online learning is technology-based education. Technology is constantly evolving. Therefore constant validation of the questionnaire is very important to use it in another study. The respondents for the present study were PPG students of IIUM. If the respondents are different the questionnaire may not give an adequate result. However, this study may help to improve the teaching and learning of students and teachers to facilitate learning.

In conclusion, I would say findings would be useful in making decisions in choosing and developing instructional interventions to facilitate learning ethically, safely and in a responsible manner in an online environment

REFERENCES

- Ahmad, T. B. T., & Nordin, M. S. (2013). University Students' Subjective Knowledge of Green Computing and Pro-Environmental Behavior, 7(6), 1–8. <http://doi.org/10.5539/Abstract>
- Awang, Z.(2015).*SEM made simple: a gentle approach to learning structural equation modeling*(1st ed.).Malaysia, MPWS rich publication.
- Brobst, J. A. (2013). *A little help from my friends: Testing the Utility of Facebook groups as online communities in an undergraduate Research Internship.The doctoral desertification University of Delaware, United States of America.*
- Buus, L. (2012). Perspectives on the Integration of Facebook Into Higher Education. In *Proceedings of the 8th International Conference on E-Learning* (pp. 437–444).
- Chambers, W. L. (2012). *Communicative Presence and Online Learning Communities: An Evidence-based Model.Doctoral desertification,University of Calgary, Calgary, Alberta.*
- Farhan, A. B. (2014). Students Awareness of using Facebook in terms of readiness at Hail University. *International Journal of Advanced Research*, 2(7), 1216–1221.
- Gano-phillips, S. (2009). Affective Learning in General Education.
- Gaskin, J.[James Gaskin].(2013, May 2).*SEM series part 3:Exploratory factor analysis.* [Video file].Retrieved from <https://www.youtube.com/watch?v=X-O-OcJPCe8>
- Gaskin,J.[James Gaskin].(2011,May 2).*Measurement model invariance.* [video file].Retrieved from https://www.youtube.com/watch?v=6j4_ZrkCxTc
- Gaskin,J.[James Gaskin].(2013,May 2).SEM series part 5a:Confirmatory factor analysis. [videofile]. Retrieved from https://www.youtube.com/watch?v=6j4_ZrkCxTc
- Gaskin, J.[James Gaskin].(2011, December 9).Validity during CFA was made easy. [Video file].Retrieved from <https://www.youtube.com/watch?v=yk6DVC7Wg7g>
- Lim, T. (2010). The Use of Facebook for online discussions among distance learners. *Turkish Online Journal of Distance Education*, 11(2), 72–81.
- Mazer, J. P., Murphy, R. E., & Simonds, C. J. (2007). I'll See You On "Facebook": The Effects of Computer-Mediated Teacher Self-Disclosure on Student Motivation, Affective Learning, and Classroom Climate. *Communication Education*, 56(1), 1–17. <http://doi.org/10.1080/03634520601009710>
- Mazer, J. P., Murphy, R. E., & Simonds, C. J. (2009). The effects of teacher self-disclosure via Facebook on teacher credibility. *Learning, Media and Technology*, 34(2), 175–183. <http://doi.org/10.1080/17439880902923655>
- Mikulec, E. A. (2012). Professional faces: Pre-service secondary teachers' awareness of issues of self-disclosure on social networking sites. *Current Issues in Education*, 15(3), 1–15.
- Moore, M. (1993). Theory of transactional distance. *Theoretical Principles of Distance*

Education.

- Mugahed Al rahmi, W., Shahizan Othman, M., & Alhaji Musa, M. (2014). The Improvement of Students' Academic Performance by Using Social Media through Collaborative Learning in Malaysian Higher Education. *Asian Social Science*, 10(8), 210–222. <http://doi.org/10.5539/ass.v10n8p210>
- Noh, N. M., Siraj, S., & Ridhuan, M. (2013). Design Of Guidelines On The Learning Psychology In The Use Of Facebook As A Medium For Teaching & Learning In Secondary School Faculty of Malaya Languages and Malaya, 2(3), 103–111.
- Nordin, M. S., Ahmad, T. B. T., Zubairi, A. M., Ismail, N. A. H., Rahman, A. H. A., Trayek, F. A. A., & Ibrahim, M. B. (2016). Psychometric Properties of a Digital Citizenship Questionnaire. *International Education Studies*, 9(3), 71. <http://doi.org/10.5539/ies.v9n3p71>
- Paul, J. A., & Cochran, J. D. (2013). key Interactions for online programs between faculty, students, technologies, and educational Institutions.A Holistic Framework. *The Quarterly Review of Distance Education*, 14(1), 49–62.
- Petronio, S. (2002). Communication Privacy Management Theory. *Boundaries of Privacy: Dialectics of Disclosure*, 168–180. <http://doi.org/10.1080/15267431.2013.743426>
- Shen, L., Wang, M., & Shen, R. (2009). Affective e-Learning : Using “ Emotional ” Data to Improve Learning in Pervasive Learning Environment Related Work and the Pervasive e-Learning Platform. *Educational Technology & Society*, 12, 176–189.
- Teoh, G., Sai, B., Liau, A., Lin, W., & Belaja, K. (2013). Challenges Faced by Distance Learners to Learn the English Language at The School of Distance Education, Universiti Sains Malaysia. *Malaysian Journal of Distance Education*, 15(1), 43–53.
- The Psychometric World.(2015,September 13).Crash Course in psychometric testing module 3[Video file].Retrieved from <https://www.youtube.com/watch?v=Y3tNKaNfb-w>
- Tung, L. C. (2012). Proactive Intervention Strategies for Improving Online Student Retention in a Malaysian Distance Education Institution. *Merlot Journal of Online Learning and Teaching*, 8(4), 312–324.
- Estate, R., & Hassan, S. Sariah Syed. (2013). Distance learning Students' need: Evaluating Interactions from Moore's Theory of Transactional Distance. *Turkish Online Journal of Distance Education*, 14(2), 292–304.
- Wang, J. (2013). What Higher Educational Professionals need to know about today's students: Online social networks. *The Turkish Online Journal of Education Technology*, 12(3), 180–193.