

Antecedents to Graduate Students Perception of Their Academic Performance: An Extended Technology Acceptance Model

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ABSTRACT

Based on review of literature it is found that the debate on using computer technology in teaching for improving students' performance and assessment remains uncertain as it is unsettling for university teachers. The Importance of this study is based on previous research that showed some instructors have accepted technological innovations in their classrooms while others have resisted such trend. The objective of this study is to provide empirical evidence on improving graduate students perception of their academic performance in Research Methods and Applied Statistics courses using internet and computer software during lectures held inside the computer center at a Lebanese University (Beirut Arab University). This research was limited to weekly computer oriented classes during one semester where students during lectures were taught theoretical explanation on how to design qualitative and quantitative research and were asked to browse internet, visit the online Emerald library, in addition to using computer software such as SPSS, NVIVO10, EViews and Excel in Research Methods and in Applied Statistics courses. Unlike some of the previous studies that showed no impact

of technology on student performance, this study showed that teaching Research Methods and Applied Statistics is like flying an airplane, students can learn more by doing than by reading. Ninety four graduate students, from the two large sections were taught by the same instructor. A modified version of the Technology Acceptance Model (e.g. Stoel and Lee, 2003) was adopted as the theoretical framework to answer the research problem on determining the direct and indirect effects of the variables that affect graduate students' perception of their academic performance. Data was collected via a 21 Likert type 5 points scale questionnaire. Factor analysis was carried out as a data-reduction technique and three items were deleted. Two statistical tests were conducted to determine the suitability of factor analysis. First, the Kaisers-Meyer-Olkin (KMO) measure of sampling adequacy score was 0.741, which was well above the recommended level of 0.5. Secondly, Bartlett's test of sphericity was significant (chi square = 1483.513, $p < 0.00$), which indicated that there were adequate correlations among the items to allow factor analysis. Principal axis factoring was used as an extraction method and oblique rotation was used as a rotation method. The five-factor solution accounted for 78.968% of the total variance. Factor

scores were used as new variables in multiple regression analysis. The range of the reliability coefficients Cronbach alpha was between 0.937 and 0.657. The Findings of Path analysis showed the direct and indirect effects of the predictors on the graduate students perception of academic performance as consequences.

Introduction

Lebanon has “a free-market economy and a strong laissez-faire commercial tradition. The government does not restrict foreign

investment; however, the investment climate suffers from red tape, corruption, arbitrary licensing decisions, complex customs procedures, high taxes, tariffs, and fees, archaic legislation, and weak intellectual property rights.” (CIA Factbook, 2013). Internationally, Lebanon is not recognized as being on the same technological level as the rest of the world. TABLE – 1 - shows that Lebanon fails to score good on different ranks:

TABLE – 1 -

International Rankings of Lebanon - 2013
http://www.theodora.com/wfbcurrent/lebanon/lebanon_international_rankings_2013.html
SOURCE: CIA World Factbook 2013

GEOGRAPHICAL NAMES

This table lists the international rankings of Lebanon in all categories that are published in the CIA World Factbook, and those that we derived from them. Additional international rankings of Lebanon can be found in the [main country ranks menu](#).
For a definition of each entry, visit the [Definitions](#) page.

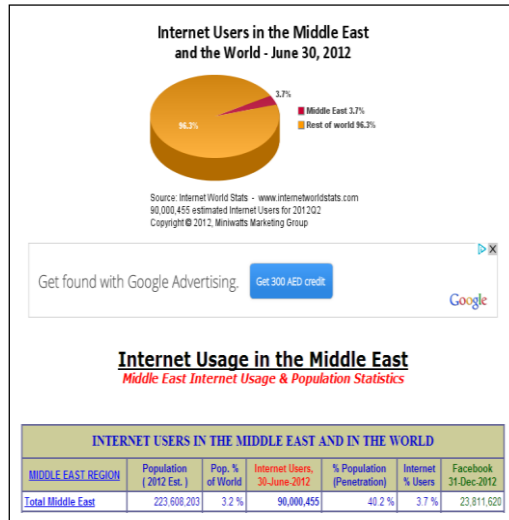
Ranked Data	Value	Rank	Date of Info
Communications			
Internet hosts	64,926	91	2012
Internet users	1,000,000	99	2009
Telephones - main lines in use	900,000	82	2011
Telephones - mobile cellular	3,350,000	121	2011
Economy			
Budget expenditures	\$12,570,000,000	83	2012 est.
Budget revenues	\$9,317,000,000	85	2012 est.
Budget surplus (+) or deficit (-) % of GDP	-7.80	193	2012 est.
Central bank discount rate(%)	3.5	101	31 Dec 2010 est.

Source: http://www.theodora.com/wfbcurrent/lebanon/lebanon_international_rankings_2013.html

Graph – 1 – shows that Internet users in the Middle East represent less than 3.7 % of

Internet users world-wide (Internet World Statistics, 2012).

GRAGH – 1 –

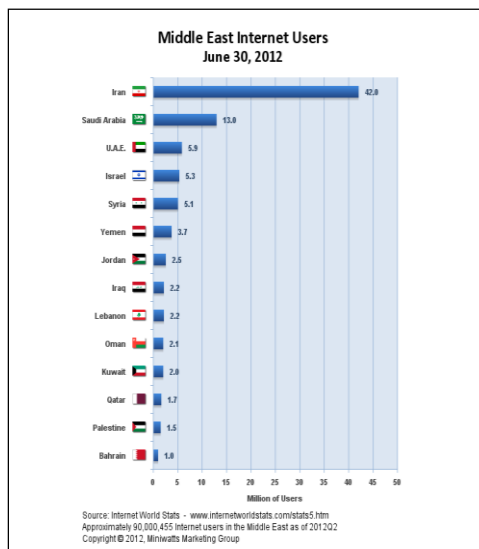


Source: <http://www.internetworldstats.com/stats5.htm>

TABLE – 2 - shows that Internet users in Lebanon represent only 2.2% of all Internet users in the Middle East, and that Lebanon

is ranked ninth among the selected 14 Middle Eastern countries (Internet World Statistics, 2012).

TABLE – 2 –



Source: <http://www.internetworldstats.com/stats5.htm>

The importance (significance) of the study

In recent years, technological improvement has forced university instructors to change the way they give lectures. The Importance of this study is based on previous research that showed some instructors having accepted technological innovations in their classrooms while others have resisted such trend. In reality the digital generation worldwide, is living the age of technological de-socialization whereby millions of people enjoy and promote the use of emerging technologies. "Going out to play after school has been replaced by relentless hours of surfing through hundreds of cable channels, playing online or console video games, browsing the Internet, or cell phone text messaging. Conversation has become all but a lost art as dinners are eaten on tray tables in front of the television and personal headsets endlessly deliver the listener's choice of thousands of MP3 songs." (Stewart, 2008). This speedy development in Information Communication and Technologies (ICT) have forced university instructors to change the way they give lectures. (Jamieson-Proctor, Burnett, Finger & Watson, 2006). That's why, for the last few years I decided to teach graduate courses such as Research Methodology, Applied Statistics and Applied Econometrics in university lectures held inside the university computer center. This innovative way of teaching may conflicts with students' past traditional educational experiences and may require a shift in their conceptions of what learning involves and how their performance is appraised but we find it quit useful. In fact, looking forward, the new jobs will be far different from the old ones and university teachers and

students should manage to ride out the technology storm. A study such as the one conducted here is recommended by experts in the area of technology adoption. Indeed, Joseph and Albert in 2012 stated that "Other areas for future research could include other possible determinants and their moderating effects, particularly those pertaining to technology, socio-cultural issues, gender and age." (Vella and Caruana, 2012)

Purpose of the Study

The objective of this research is to provide empirical evidence on improving graduate students perception of their academic performance in two courses : the Research Methods and Applied Statistics using internet and computer software during lectures that were held inside the computer center at a Lebanese University (Beirut Arab University).

Statement of the Research Problem

This study is an attempt to understand the antecedents to graduate students perception of their academic performance. The theoretical model shown in Graph – 2 - is a revised version of the Technology Acceptance Model (TAM) presented by Venkatesh and Davis (2000). Overall, the TAM model is useful for determining and evaluating user acceptance of any new system or technology.

Research Methodology and Procedures

This research was limited to weekly computer oriented classes during one semester where students during lectures that

was held inside the computer center were taught theoretical explanation of Research Methods and Applied Statistics courses in addition to browsing internet, visiting the online Emerald library, using computer software such as SPSS, NVIVO10, EViews and Excel as well as they were educated on how to develop the ability to select and use the appropriate research technique that suits the variables' level of measurement.

Participants

The research sample consisted of 92 graduate students in this researcher's two graduate classes : 1- Research Methodology and, 2- Applied Statistics that were held inside the university computer center whereby students learned theory and practice. All students learned how to retrieve relevant articles by visiting the Emerald library and during the same lecture they trained on using computer software such as SPSS, EViews, Excel , or NVIVO10. Team Research Project was the final, capstone core subject of the two graduate courses. This team project served to bridge the gap between theory and practice by requiring each student to undertake a major applied research project that asks a major research question and then proposes solutions to this 'real-world' problem. Each group choose a topic from a list of options proposed by the researcher. Interestingly, the reactions of graduate students during the first two weeks of the semester, to the changes in their traditional classroom lecture did range from fear and panic to enthusiastic support.

Measures

A one – page questionnaire was developed by the researcher to collect data from

graduate classes in the two classes ; 1- the “Research Methodology Using Internet and Computer Course” and in, 2- “Applied Statistics Using Internet and Computer Course”. Respondents were asked to indicate the extent of their agreement with each item on a five point Likert –Type scale, ranging from 1-strongly disagree to 5-strongly agree. Before distributing the questionnaire, the content validity was improved by other instructors in the university.

Perceived ease of use

The first variable measured was Perceived Ease of Use which refers to “ the degree to which a person believes that using a particular system would be free of effort” (Davis, 1989, p. 82). Perceived Ease of Use was measured using a five -items, modified from previous Technology Acceptance Model research (Deane, Podd and Henderson, 1998). The Cronbach alpha obtained for this scale was 0.908 , and is considered acceptable for research purposes (e.g. Nunnally, 1968).

Perceived usefulness

The second variable measured was Perceived Usefulness defined as “the degree to which a person believes that using a particular system would enhance his/her job performance” (Davis, 1989, p. 82). Perceived Ease of Use was measured using a four-item scale, modified from previous Technology Acceptance Model research (Deane, Podd and Henderson, 1998). The Cronbach alpha obtained for this scale was 0.851, and is considered great for research purposes (e.g. Nunnally, 1968).

Technology Resistance

Whether we like it or not, technology is here to stay. The third variable measured was Technology Resistance which is the normal user reaction that has to be overcome before adoption may begin (Morris and Venkatesh, 2000). The questions measuring resistance to change were based on prior studies with modifications to fit the specific context of Technological innovation in education. This researcher created a four-item Likert scale that examined the extent to which graduate students feared using institutional devices such as computer software and internet in their class work. The Cronbach alpha obtained for this scale was 0.937, and is considered great for research purposes (e.g. Nunnally, 1968).

Teaching at a distance

The fourth variable Teaching at a Distance using a four-item scale, modified from previous research (Logan and Thomas, 2002). The Cronbach alpha obtained for this scale was 0.789, and is considered good for research purposes (e.g. Nunnally, 1968).

Graduate students perception of their academic performance

The fifth variable measured was Graduate Students Perception of Their Academic Performance

using a two-item scale. The Cronbach alpha obtained for this scale was 0.657, and is considered acceptable for research purposes (e.g. Nunnally, 1968).

Results and their interpretation

Two statistical tests were conducted to determine the suitability of factor analysis. First, the Kaisers-Meyer-Olkin (KMO) measure of sampling adequacy score was 0.741, which was well above the recommended level of 0.5. Secondly, Bartlett's test of sphericity was significant (chi square = 1483.513, $p < 0.00$), which indicated that there were adequate correlations among the items to allow factor analysis. Principal axis factoring was used as an extraction method and oblique rotation was used as a rotation method. The five-factor solution accounted for 78.968% of the total variance. Factor scores were used as new variables in multiple regression analysis. Using SPSS and stepwise method excluded the non – significant “Teaching at Distance”. Table – 3 - , TABLE – 4 – and TABLE – 5 – show the output of factor analysis. Graph – 2 - shows the results of the Path Analysis.

TABLE – 3 –

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.	.741	
Bartlett's Test of Sphericity	Approx. Chi-Square	1483.513
	df	153
	Sig.	.000

TABLE – 4 –

Total Variance Explained							
Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings ^a
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	
1	6.464	35.913	35.913	6.464	35.913	35.913	5.152
2	2.683	14.905	50.818	2.683	14.905	50.818	2.982
3	2.259	12.548	63.366	2.259	12.548	63.366	2.224
4	1.703	9.460	72.826	1.703	9.460	72.826	4.920
5	1.106	6.143	78.968	1.106	6.143	78.968	2.118
6	.792	4.400	83.369				
7	.678	3.766	87.134				
8	.484	2.691	89.826				
9	.442	2.457	92.283				
10	.327	1.814	94.097				
11	.279	1.549	95.646				
12	.231	1.285	96.931				
13	.178	.989	97.920				
14	.133	.737	98.657				
15	.100	.556	99.212				
16	.061	.337	99.549				
17	.048	.268	99.817				
18	.033	.183	100.000				

Extraction Method: Principal Component Analysis.

a. When components are correlated, sums of squared loadings cannot be added to obtain a total variance.

TABLE – 5 – Structure Matrix

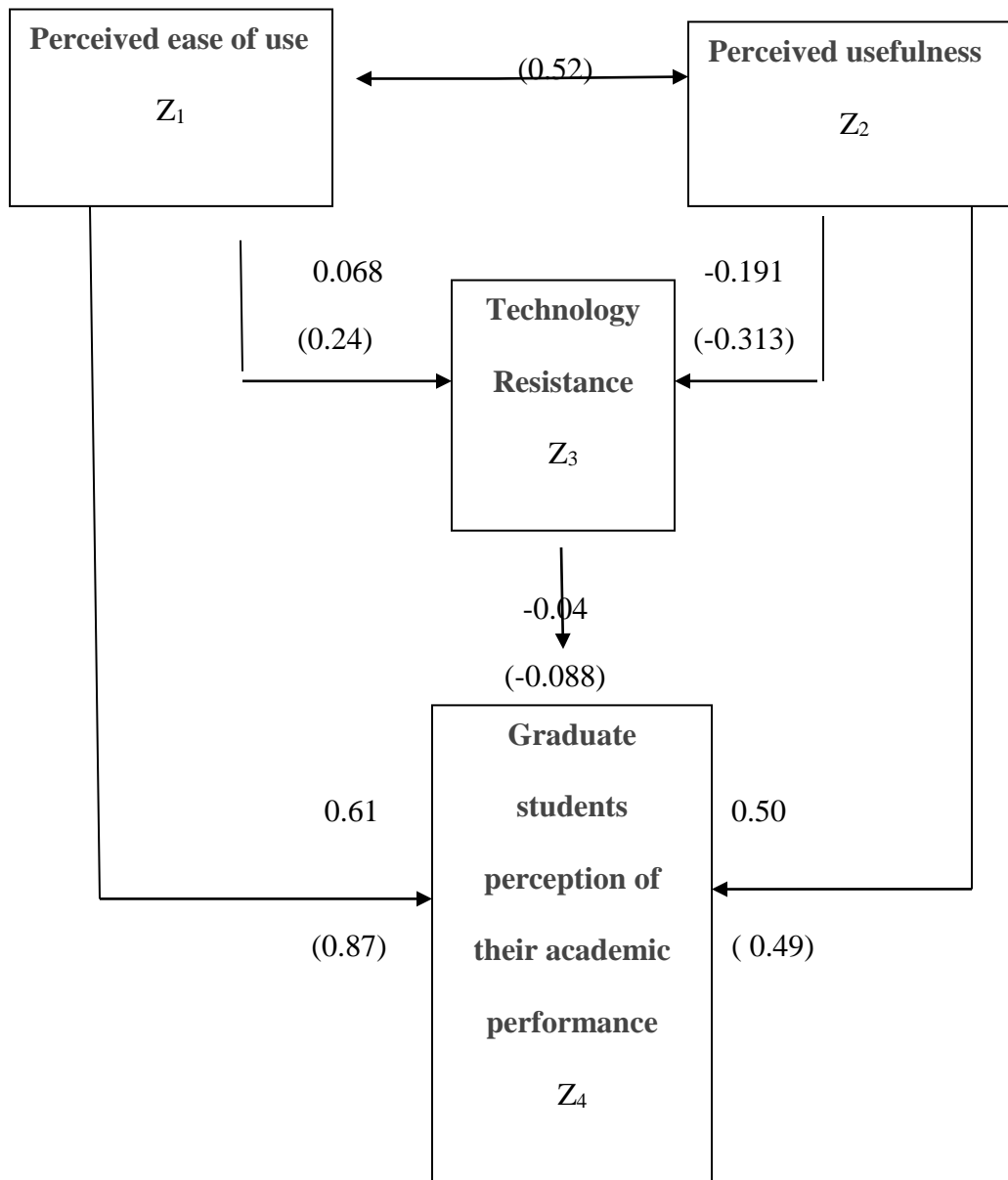
	Component				
	1	2	3	4	5
Computers scare me	.975	.154	-.013	.506	.248
Computers make me feel uneasy	.956	.176	.080	.525	.302
I am not able to locate the answers of the questions in the assignments using internet	.922	.198	.062	.472	.326

I do not use computer because it is not effective	.894	.016	-.062	.338	-.005
I think that I would like to use computer in my courses	.017	.856	.085	.095	.171
I rarely make errors when using computer in my courses	.152	.854	-.014	.061	.040
I believe it is useful to use internet for my coursework	.140	.822	.165	.167	.166
Internet is useful in the rapid retrieval of information	.099	.793	-.133	.046	.032
Faculty must be prepared to meet the special requirements of teaching at a distance	-.018	.004	.876	.133	.072
Computer Provides more time for other things	.046	.006	.864	-.001	-.098
I prefer taking classes that are delivered entirely "on-line" with no required face- to- face interactions	-.027	.053	.765	.079	-.316
I find internet flexible to interact with	.433	.108	.039	.930	.294
I would find it easy to get computer do what I want it to do	.579	.124	.048	.908	.171
It is easy for me to become skillful at using computer	.318	.132	.099	.871	.235
Learning to use technology would be easy for me	.348	.014	.109	.800	.363
Using computer makes it easier to do assignment	.713	.152	.087	.734	.110
Computer helps me to perform my task quickly	.158	.147	-.157	.263	.892
Internet helps me to eliminate errors from the assignment/project	.553	.164	-.008	.537	.758
Extraction Method: Principal Component Analysis.					
Rotation Method: Oblimin with Kaiser Normalization.					

GRAPH – 2 –

Path Analysis (Recursive System)

Decomposing the Simple Relations into Direct and Indirect Effects



The mathematical model underlying the relations that lead to in solving the recursive causal model are:

$$Z_1 = \beta_2 Z_2 + R_U \quad (1)$$

$$Z_2 = \beta_1 Z_1 + R_U \quad (2)$$

$$Z_3 = \beta_1 Z_1 + \beta_2 Z_2 + R_W \quad (3)$$

$$Z_4 = \beta_1 Z_1 + \beta_2 Z_2 + \beta_3 Z_3 + R_V \quad (4)$$

$$r_{12} = p_{21} \quad (5)$$

$$r_{13} = p_{31} + p_{32} p_{21} \quad (6)$$

$$r_{23} = p_{31} p_{21} + p_{32} \quad (7)$$

$$r_{41} = p_{41} + p_{42} p_{21} + p_{43} p_{31} + p_{43} p_{32} p_{21} \quad (8)$$

$$r_{42} = p_{41} p_{21} + p_{42} + p_{43} p_{31} p_{21} + p_{43} p_{23} \quad (9)$$

$$r_{43} = p_{41} p_{31} + p_{41} p_{31} p_{21} + p_{42} p_{31} p_{21} + p_{42} p_{32} p_{43} \quad (10)$$

Conclusion

As was expected, Perceived ease of use , Perceived usefulness are positively related to Graduate students perception of their academic performance while Technology Resistance is negatively related to Graduate students perception of their academic performance. In light of the global trend towards using technology in the higher education institutions, the findings of the current study have clearly revealed several useful implications.

Technology Acceptance Model (TAM) can be employed as a useful theoretical base to predict and understand graduate students

perception of their academic performance. It is essential to focus on the positive perception of technology usefulness.

Future studies could be conducted to examine Technology Acceptance Model (TAM) with a different sample of graduate students in different graduate courses taught inside the computer center using Internet and computer software.

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