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Study of satisfaction and usability of the Internet on student's performance

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ABSTRACT

Using the extended task-technology fit (TTF) model, this paper aims to examine satisfaction and usability of internet usage on students' assignment completion tasks and their performance. In the extended TTF model, technology resistance and technology usage was also considered. The study was conducted at a management institute in Mumbai and questionnaires were distributed to 221 post-graduate students. The results indicate that technology satisfaction and the internet usage significantly explains the variance on students' performance. Task-technology fit is the predictor for internet usage, whereas it is not a predictor for technology resistance. Technology Satisfaction is the predictor of Technology resistance, student's performance and internet usage. Internet usage is the predictor of Technology satisfaction and student's performance. Since these factors are found to have significant relationship with students' performance, the management and decision makers in universities and institutes need to give higher importance as to how students could use the internet efficiently and effectively.

Keywords*: Information and Communication technologies, Internet, Students, Satisfaction, Usage, Performance*

INTRODUCTION

Use of the internet to support learning and teaching is growing exponentially as more and more educational organisations are recognising the potential that it offers (Norzaidi et al., 2007a, b). From the internet, students would simply gather variety of latest information that is useful for their assignments. It is common to say that more than 50 percent of students' assignments are based on information from the internet (Norzaidi and Intan Salwani, 2008a, b). Thus, today, academic life without access to the internet is hardly imagining (Spennemann et al., 2007). However, much still unknown about how university students use the internet information systems for academic work (Aiken et al., 2003). Although the Internet can provide new ways of teaching and learning, it does not guarantee that learning objectives will be met (Kirkwood & Price, 2005). Issues such as, technology resistance, technology satisfaction, task-technology fit, and usage have raised the question of whether universities have been on the right track in terms of students' internet usage and its effectiveness, particularly after making huge investments on the internet systems.

This study examines the perception of university students on use of internet, in their assignment completion task, using the extended task-technology fit (TTF)model. The model developed and applied in this study is the combination of the TTF model (Goodhue and Thompson, 1995), components of DeLone and McLane (1992)US Model (i.e. user satisfaction), and technology resistance (Norzaidi et al., 2008a, b, c). Technology resistance is added in the extended TTF model since it is likely that, if task requirements (student's

assignment) and technology functionalities of the internet do not fit, then, rejection of the internet could be high. Technology resistance in the context of this paper means resistance towards using internet for completion of assignments. Consequently, students might not make use of the internet for completing their assignments. In this case, the students may find other substitutes, for instance, referring to printed materials (i.e. text books, journals, newspapers, etc.) in the library rather than collecting data or information from the internet. Also, it is possible that students may be satisfied from internet usage and keep on using it in order to carry out their next assignments. For these rationales, technology resistance, and technology satisfaction are included in the extended TTF model.

RESEARCH OBJECTIVES

The study has the following objectives:
1. Does task-technology fit predict the internet usage?
2. Does the internet usage predict students' performance?
3. Does task-technology fit predict technology resistance?
4. Does technology resistance fit predict students' performance?
5. Does the internet usage predict technology satisfaction?
6. Does technology satisfaction predict the internet usage?
7. Does technology satisfaction predict technology resistance?
8. Does technology satisfaction predict students' performance?

If these factors are found to have significant relationship with students' performance, then recommendations would be made on how students could use the internet efficiently and effectively in order to improve their performance.

LITERATURE REVIEW

The extant literature on Internet technology in the classroom has established that students are receptive to Internet usage for information and learning (Lundgren & Nantz, 2003). It can also enhance research skills and cross-cultural learning by providing a better understanding of foreign countries and cultural differences as well as enhance students' cross-cultural communication skills (Greene & Zimmer, 2003; Lawson, White, & Dimitriadis, 1998). Peng, Tsai, & Wu (2006), found that students' Internet attitude was influenced by gender, self-efficacy, and perceived Internet utility. While most students indicated a positive attitude toward the Internet and adequate Internet usage skills, males tended to have a more positive attitude than females. The majority of the students tended to view the Internet as a functional tool, but those who saw the Internet as a leisure tool had a more positive attitude toward the Internet and demonstrated better communication skills. Several researchers have examined student attitudes toward Internet usage and its benefits to international business education (e.g., Alon, 2003; Greene & Zimmer, 2003). In a study conducted by Tran and Ward it was found that student attitude towards the Internet had a significant impact on whether or not they enjoyed the Internet assignment, but that did not influence objective, expected, or behavioral performance measures while student attitude toward international business had a positive significant relationship with their expected, behavioral, and attitudinal (Enjoyment) performance. Based on TTF model, Goodhue and Thompson (1995) describes TTF as the degree to which a technology assists an individual in performing his or her portfolio of tasks. Usage, on the other hand, refers to the behavior of employing the internet in completing given tasks (Goodhue and Thompson, 1995). To date, there are few studies that absolutely associate TTF and students' performance. However, there are a few studies that concentrate on task-technology fit and managerial performance. Norzaidi et al.'s (2007a, b), study on the impact of internet usage on middle managers' performance. The results indicate that TTF and the internet usage significantly explain the variance on middle managers' performance and TTF is a predictor of the internet usage. They also predicted that task-technology fit is a

predictor of an individual's performance. In addition, both TTF and technology usage are found to be significant predictors of performance.

The studies concerning internet usage and students' performance however, are not many. Jackson et al. (2006) conducted a study and found that students, who used the internet more, scored higher on standardized test of reading achievement and had higher grades. Similarly, a study by Turner and Farmer (2008) found that actual students' outcomes in term of grade, of the internet-based multimedia classroom, was a 36 percent increase in grades, and a 56 percent reduction in failures. The significant drop in failure rate could be attributed to the integrated blending of online and in-class format through the cyber classroom, since most failures was due to the student vanishing for extended periods of semester due to external problems and commitments.

The issues of technology resistance and user performance are not new and have always been the greatest proportion of literature as the unit of analysis (Igbaria, 1990).

In spite of this, there is no literature that discuss on students technology resistance and their academic performance. There is a study that examined the relationship between technology resistance and managerial performance. Norzaidi et al., (2008a,b), investigated the internet usage and its impact on managers' resistance towards technology. The findings show that there is no significant relationship between technology resistance and managers' performance because managers have no opportunity to resist the Internet usage since they are compelled to use the system in performing their daily tasks. A study by Aiken et al. (2003) reported over 270,000 unique visitor views of 700,000 web pages on the University of Mississippi's campus system. The findings show that user complained about the speed of downloading pages. In short, the survey concluded that there was neutral satisfaction with delay on web speed, and slightly better overall technology satisfaction with the campus internet service provider (ISP). As a user, students may prefer that information in the internet is up to date, high-quality contents, and in a decent format. On top, students may favor ease of using the internet.

RESEARCH METHODOLOGY AND RESEARCH HYPOTHESIS

A questionnaire based survey was conducted at a management institute in a metropolitan city of India. The city where the research was conducted is Navi Mumbai, a suburb of Mumbai. The respondents are students pursuing their post-graduate degrees in management and computer application. The questionnaire is divided into five sections to specifically address the eight hypotheses formulated in the study. The first section contains four questions capturing the respondents' demographic information such as age, gender, and education. The remaining sections comprise of seven items on task-technology fit (section 2), two items on the internet usage (section 3), four items on technology resistance (section 4), four items on technology satisfaction (section 5), and six items measuring students' performance (section 6). All the items in sections 2 to 5 were measured using a five-point Likert scale from 1 for strongly disagree to 5 for strongly agree except section 4 (technology satisfaction) was measured using a five-point Likert scale from 1 for never to 5 for always. SPSS was used for data analysis.

The following hypothesis would be tested

H1. Task-technology fit is a predictor of internet usage.
H2. Internet usage is a predictor of students' performance.
H3. Task-technology fit is a predictor of technology resistance.
H4. Technology resistance is a predictor of students' performance.
H5. Internet usage is a predictor of technology satisfaction.
H6. Technology satisfaction is a predictor of the internet usage.
H7. Technology satisfaction is a predictor of technology resistance.
H8. Technology satisfaction is a predictor of students' performance.

FINDINGS AND DISCUSSION

The demographic profiles of the respondents is as follows. There are 115 females and 106 males. Most of them fall between the age group of 20-29 years old, with very few above that age group. They are all post-graduate students of a management college. 153 are full-time students, whereas 68 are part-time students.

As for their under-graduate degree, the groups are as below
Commerce - 87 students
Bachelor of Management Studies – 6 students
Bachelor of Science – 97 students
Bachelor of engineering– 25 students
Bachelor of Computer applications – 6 students

As for their specialization, the groups are as below
Finance – 81 students
Marketing - 44 students
Systems – 80 students
Biotech – 10 students
Human Resource – 6 students

The sampling technique used was convenient sampling. There was no particular criteria for choosing the respondents. It was a random sample. The group consisted of a mix of males and females. Also, it was tried to cover respondents from different streams of management so as to remove dependency on any particular type of specialization.
Table I shows the mean and standard deviation scores of the variables. Despite a high standard deviation, the results show that the respondents agree that the internet functionalities could fit their need to complete assignments. They were also satisfied with the information provided on the internet. The results also indicate that there is a fit between task requirements and technology functionality. The respondents use the internet quite frequently. The results also provide indications that the respondents generally do not resist to the internet usage. The table further indicates that the students believed that the internet usage improved their academic performance. Cronbach Alpha lies between the range 0.56 to 0.89 for the variables in the study, so we can conclude that the questionnaire is reliable and the data can be applied for the analysis.

Table I: *Mean, SD and Cronbach's Alpha for the Variables*

Statements	**Mean**	**SD**	**Cronbach's Alpha**
Internet helps me in better understanding of the project/assignment.	4.3	0.85	0.83
I am able to locate the answers of the questions in the project/assignments using the internet.	4.05	0.83	
There are no compatibility issues while using the internet.	3.82	0.97	
Internet is a reliable technology to use.	4.1	0.87	
I do not need any training to use the internet to complete my project/assignment.	3.98	1.07	
Internet is as easy to use technology for project/assignment completion task.	4.07	0.94	

Statements	Mean	SD	Cronbach's Alpha
I do not need any assistance to use the internet to complete my project/assignment.	3.79	1.1	
I use internet frequently.	4.3	0.97	0.76
I spend more than an hour every day on the internet	3.98	1.23	
I use internet because my friends use it.	1.92	1.13	0.56
I use internet because of its good design.	2.8	1.38	
I do not use internet because it is not effective (does not match my efficacy expectations)	1.72	1.1	
I use internet because of my good prior experience	3.71	1.06	
I am satisfied by the contents of the information found on the internet.	3.98	0.81	0.85
I am satisfied by the accuracy of the information found on the internet.	3.75	0.82	
I am satisfied by the format in which information is found on the internet.	3.68	0.88	
I am satisfied by the timeliness in which information is found on the internet.	3.96	0.81	
Internet helps me to accomplish my task quickly	4.05	0.75	0.89
Internet helps me to improve the quality of work for the assignment/project	4.01	0.8	
Internet helps me to improve job performance.	3.93	0.86	
Internet gives me better control over work.	3.74	0.97	
Internet helps me to eliminate errors from the assignment/project.	3.72	0.96	
Internet helps me to enhance effectiveness of my assignment/project.	4.05	0.79	

The Cronbach alpha calculated for the various groups of statements is more than 0.5. This proves the validity of the instrument. The mean value for all statements for Task-technology fit group has a value more than 3.5, which shows that respondents feel that internet is fit for the task of project completion. The mean value for Internet usage statements, are more than 3.5, showing that the respondents use internet frequently. The mean value for Technology resistance statement group shows that there is no resistance in using the internet by the respondents. The mean value of Technology satisfaction statements group is more than 3.5 for all the statements. This shows that the respondents are satisfied from internet. The mean value for Student performance statement group is more than 3.5 for all the statements. This shows that internet is helping the students in improving their performance.

Table II shows the results for factor analysis through the rotated component matrix for all the components.

Table II: *Rotated Component Matrix*

	Component				
	1	**2**	**3**	**4**	**5**
Internet helps me in better understanding of the project/assignment.	.236	.626	.315	3.372E-02	.103
I am able to locate the answers of the questions in the project/assignments using the internet.	.193	.658	.284	1.568E-04	5.192 E-02
There are no compatibility issues while using the internet.	.118	.638	.318	6.651E-02	9.744 E-02
Internet is a reliable technology to use.	.141	.440	.493	2.658E-02	-.143
I do not need any training to use the internet to complete my project/assignment.	8.441E-03	.723	9.607 E-02	.184	-.168
Internet is as easy to use technology for project/assignment completion task.	.247	.630	.308	.202	-.200
I do not need any assistance to use the internet to complete my project/assignment.	7.518E-02	.674	-5.695 E-02	.176	8.383 E-02
I use internet frequently.	6.305E-02	.359	4.828 E-02	.729	-.196
I spend more than an hour every day on the internet	.104	.223	-1.100 E-02	.797	-4.950 E-02
I use internet because my friends use it.	2.315E-02	4.253 E-02	1.412 E-02	-1.092E-02	.850
I use internet because of its good design.	.101	-6.420 E-02	.179	.482	.596
I do not use internet because it is not effective	-9.845E-02	-1.017 E-02	-9.084 E-02	-.193	.758
I use internet because of my good prior experience	.318	-5.368 E-04	.354	.552	.132
I am satisfied by the contents of the information found on the internet.	.228	.258	.652	.192	-4.106 E-02
I am satisfied by the accuracy of the information found on the internet.	.293	.149	.779	-1.806E-02	.107
I am satisfied by the format in which information is found on the internet.	.240	.153	.763	2.445E-02	3.157 E-02
I am satisfied by the timeliness in which information is found on the internet.	.169	.256	.741	.123	-5.346 E-02
Internet helps me to accomplish my task quickly	.754	.188	6.532 E-02	2.569E-02	1.024 E-02
Internet helps me to improve the quality of work for the assignment/project	.741	.210	.126	.119	-.133
Internet helps me to improve job performance.	.800	.149	.267	6.666E-02	-7.913 E-03
Internet gives me better control over work.	.785	4.774 E-02	.231	.125	4.757 E-02

	Component				
	1	**2**	**3**	**4**	**5**
Internet helps me to eliminate errors from the assignment/project.	.741	3.916 E-02	.314	2.208E-02	1.330 E-02
Internet helps me to enhance effectiveness of my assignment/project.	.780	.131	.130	.139	1.370 E-02

Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.
a Rotation converged in 7 iterations.

The Table II shows the same grouping of variables with which we started in the questionnaire. 5 components were obtained and the grouping of the variables is as expected in the study. The components found are Task-technology fit, Technology resistance, Internet Usage, Technology Resistance, Student performance.

On finding out the correlations between the factors obtained from factor analysis Table III was obtained.

Table III: *Correlations between the factors*

	Task-technology fit	**Internet usage**	**Technology Resistance**	**Technology Satisfaction**	**Student Performance**
Task-technology fit		.382**	.091	.583**	.434**
Internet usage	.382**		.111	.230**	.238**
Technology Resistance	.091	.111		.203**	.182**
Technology Satisfaction	.583**	.230**	.203**		.533**
Performance	.434**	.238**	.182**	.533**	

** Correlation is significant at the 0.01 level (2-tailed).

Table III shows which factors have significant correlation among them. The correlation between Task-technology fit and Internet Usage, between Task-technology fit and technology satisfaction, Task-technology fit and Student performance is high, whereas the correlation between Technology Resistance and Technology Satisfaction, and Technology Resistance and Student performance is low, even though it is significant. The other correlations such as between Student performance and Internet usage, Technology satisfaction and Internet usage, Internet usage and Student performance are also high.

Using linear regression, the hypotheses were tested. Table IV was obtained for the various hypotheses.

Table IV: *Hypothesis Results*

Hypothesis	**Causal Relationship**	**Factor**	**Std. error**	**Significance**	**Result**
H1	Task-technology Fit	Internet Usage	.031	.000	Accepted
H2	Task-technology fit	Technology resistance	.051	.180	Rejected
H3	Technology	Technology	.075	.002	Accepted

Hypothesis	Causal Relationship	Factor	Std. error	Significance	Result
	satisfaction	resistance			
H4	Internet Usage	Student's Performance	.137	.000	Accepted
H5	Technology Satisfaction	Student's Performance	.086	.000	Accepted
H6	Technology Resistance	Student's Performance	.089	.002	Accepted
H7	Internet Usage	Technology Satisfaction	.091	.001	Accepted
H8	Technology Satisfaction	Internet Usage	.048	.001	Accepted

Thus, we see that Task-technology fit is the predictor for internet usage, whereas it is not a predictor for resistance. Technology Satisfaction is the predictor of Technology resistance, student's performance and internet usage. Internet usage is the predictor of Technology satisfaction and student's performance.

CONCLUSION

This paper examines the causal relationships between the internet usage and post-graduate students' performance. This study is providing a holistic perspective of the critical factors that influence technological usage, in light of the internet technology. The model used is based upon a unified framework combining task-technology fit model with theories related to technology resistance and technology satisfaction, which were identified from the extensive review of literature. This paper imparts further empirical support that task-technology fit has significant relationships with the internet usage. Correspondingly, empirical support was also provided for the results between the internet usage and students' performance. As expected, technology satisfaction has relationship with students' performance, in which the results are in consistency with Hayden et al. (2005) and Norzaidi et al. (2008a, b) studies. The mean scores also reflect the same. Above average mean was obtained for attributes measuring task-technology fit, the internet usage, technology satisfaction and students' performance.

These findings suggest that in order to attain improvements in the students' performance, the decision-makers have to consider the fit between the tasks requirements and the functionalities of their internet systems. When there is a fit, this would create a positive perception among the students in terms of the usefulness and satisfaction of their internet systems and therefore, promote higher level of usage among them. In line with the studies conducted by Norzaidi et al. (2008a, b), this study found significant relationship between the internet usage and technology satisfaction. In other words, the students' usage of the internet system does lead to satisfaction towards the system. This study proved that internet usage is a predictor of technology satisfaction, as well as technology satisfaction is a predictor of the internet usage. Besides, the findings illustrate that task-technology fit does not predict technology resistance. This suggests that the resistance towards a technology could be for various other reasons as well. Students' performance is affected by internet usage and their resistance towards it. Most of the students were satisfied by the information they found on the internet. Hence, it can be said that internet's usage is found to be useful in improving the student's performance.

REFERENCES

Aiken, M., Vanjani, M., Ray, B. and Martin, J. (2003). "College student internet use", *Campus-Wide Information Systems*, 20(5), 182-5.

Alon, I. (2003). Experiential learning in international business via the world wide web. *Journal of Teaching in International Business, 14*(2-3), 79-98.

DeLone, W.H. and McLane, E.R. (1992). "Information systems success: the quest for the dependent variable", *Information Systems Research*, 3(1), 60-95.

Goodhue, D.L. and Thompson, R.L. (1995). "Task-technology fit and individual performance", *MIS Quarterly*, 19(2), 213-36.

Greene, C.S. & R. Zimmer (2003). An international Internet research assignment – assessment of value added. *Journal of Education for Business, 78*(3), 158-163.

Igbaria, M. (1990). "End user computing effectiveness: a structural equation model", *Omega International Journal of Management Science*, 18(6), 637-52.

Jackson, L.A., Eye, A.V., Biocca, F.A., Barbatsis, G., Zhao, Y. and Fitzgerald, H.E. (2006). "Does home internet use influence the academic performance low-income children?", *Development Psychology*, 42(3), 1-7.

Kirkwood, A. & L. Price (2005). Learners and learning in the twenty-first century: What do we know about students' attitudes towards and experiences of information and communication technologies that will help us design courses? *Studies in Higher Education, 30*(3), 257-274.

Lawson, D., D.S. White, & S. Dimitriadis (1998). International business education and technology-based active learning: Student-reported benefit evaluations. *Journal of Marketing Education, 20*(2), 141-148.

Lundgren, T.D. & K.S. Nantz (2003). Student attitudes toward Internet courses: A longitudinal study. *The Journal of Computer Information Systems, 43*(3), 61-66.

Norzaidi, M.D., Chong, S.C., Azizah, A., Intan Salwani, M., Rafidah, K. and Rohana, Z. (2007a). "The effect of students' backgrounds and attitudes on computer skills in Malaysia", *International Journal of Management in Education*, 1(4), 371-89.

Norzaidi, M.D., Chong, S.C., Murali, R. and Intan Salwani, M. (2007b). "Internet usage and managers' performance in the port industry", *Industrial Management & Data Systems*, 107(8), 1227-50.

Norzaidi, M.D. and Intan Salwani, M. (2008a). Information Technology Management (IT) Models: An Introduction, *University Publication Centre*, Shah Alam, Selangor.

Norzaidi, M.D. and Intan Salwani, M. (2008b). Internet and Electronic Data Interchange (EDI) Usage in Malaysia Port Industry, *University Publication Centre*, Shah Alam, Selangor.

Norzaidi, M.D. and Intan Salwani, M. (2008c). "TECHPROVED model: new business information technology diagnostic tool", paper presented at 57th World Invention, Research and New Technologies, Brussels, 10-13 October.

Peng, H., C-C Tsai, & Y-T Wu (2006). University students' self-efficacy and their attitudes toward the Internet: The role of students' perceptions of the Internet. *Educational Studies, 32*(1), 73-86.

Spennemann, D.H.R., Artkinson, J. and Cornworth, D. (2007). "Sessional, weekly and diurual patterns of computer lab usage by students attending a regional university in Australia", *Computer and Education*, 49(3), 726-39.

Turner, S. and Farmer, M.E. (2008). "Assessing of student performance in an internet-based multimedia classroom", Proceedings of International Conference on Frontier in Education Computer Science and Computer Engineering, Las Vegas, 14-17 July, 1-5.