

Applying Correlation Analysis and TAM for Determining Relationship Between two Variables

Pitchayakorn Lake
Faculty of Information Technology
Siam University, Bangkok, Thailand
E-mail: pitchayakorn@siam.edu

Abstract

Future scenarios of political, economics and education sectors will depend on the contributions of students. The twenty-first century educator is a visionary. Teachers see the potential in the emerging tools and technology innovations in order to manipulate them to serve students needs. The universities across the world have incorporated in learning systems. The success of educator requires an extensive understanding of technology innovations. Educational innovations will be effective if they research on educational technology i.e. technology-learning process and technology in using hardware and software. The research use TAM in order to stimulate to learn more. The objective of this research is to study the relationship between two variables of Information Technology and Computer for Studies and Works by using correlation analysis. Data collection were obtained from 284 respondents with the mean of 406.6 on MS. Word and SD. is 291.9. The mean on MS. Excel is 291.9 and SD. is 313.8. The students who got MS. Word scores better on average than MS. Excel scores. Out of the 284 respondents 128 (45.1%) were male and 156 (54.9%) were female. The result shows that correlations coefficient r_{xy} is 0.749. The coefficient is calculated by taking the covariance of the two variable. The students who got MS. Word and MS. Excel scores, were linear correlated statistically significant at 0.05 ($F=360.63$, $p = 0.000$). The researcher used variable of MS. Word scores as a predictor, which can predict 56.1% of MS. Excel scores. The regression equation is $MS. Word = 131.718 + 0.942 (MS. Excel)$.

Keywords: Information Technology, Computer for Studies and Works, Correlation Analysis

Introduction

Most Asian countries, education systems were tradition teacher-centred. Students were expected to remember and recall information when asked as it was thought (Carter, 2006). Traditional approaches did not suffice in many countries. Thailand has reformed its education methods focusing the 21st Century. Nowadays, Thailand has become part of the Asian Economic Community which offers its challengers. The issue of students or child-centred learning has seen an explosion of interest among educators. This term has been recognized since Thai National Education Act 1999 which has helped Thai people to cope with increasing demands of knowledge in the world of information and technologies. Students-centered learning models, which are placed at the learning process such as student needs, opinions, background, and goals have been acknowledged within the learning environment. Teachers are still guiding students in order to persuade them to think and make decisions. Students were being encourage to become critical thinkers and acquire information technology skills based on the student-centred models. According to Tsang-Kosma (2003), in the 21st century, technology is very important. It can affect the way of communication, but also in the way we teach and learn. It can effectively solve problems and be able to process as well as apply information. They use technology in order to maximize the productivity. Teachers should focus on creating a learning environment that incorporates technology as well as speeding up the skills towards empowering students. If integrated properly,

technology such as computers and the Internet will enrich the learning environment by using medium instruction as tools that enhance student learning. Technology can change learning from teacher-centred to student-centred learning. It provides new knowledge. Since the knowledge is everywhere, and students can access it through the Internet. The new paradigm in education is to teach the students how to make decisions and educate them how to use software as tools. Teachers need to encourage students in order to gain independent thinking, flexibility and the ability to acquire new knowledge. This subject of this study is to analyze the relationships between variables of MS. Word and MS. Excel. The effective learning by a study of coefficient relationship: This case study of using variables MS. Word and MS. Excel have been studied, and the data from study results in significance are less than 0.05. The research analysis shows how the use of technology with the relation to the users experience. It shows relationship between the two programs. The research problem was difficult to differentiate between the two software elements in rethinking education to establish how the two elements of software and how they are used via smart phones.

Literature Review

Nowadays, teachers educate students through variety of media channels. Worley and Kalen (2011) called "Educating College Student of Net Generation". Gloecker (2008) termed group of people, who were born between 1980 and 2000 as "millennials". College students use different learning techniques.

Teachers must use different teaching styles. Traditional methods of instruction will no longer suffice in society that has encountered “a paradigm shift from emphasizing teaching to emphasize learning” (Wilson, 2004, p. 29). Teachers need to adjust their teaching skills for new learners. The purpose of this study is to incorporate new technology methods and to create a better system of learning which will inevitably create a better environment so all students can benefit.

Generational diversity (Garner, 2007), will impact the adult education. Garner (2007) stated that as can-do youth who generated new habits and attitudes that older generation have never associated such as on social issue, teamwork, achievements and good conduct. Garner (2007) maintained that the next generation will be influenced by retail sales, parenting, leadership, fashion, media, advertising, finances and corporate.

Students need to use technology tools to acquire information and to produce reports. Adult life may emphasize hard work to achieve and academic success, “A key characteristic of this generation is that they are very educationally oriented” (Barnes et al., 2007, p.1). “Create a classroom dynamic and use strategies that will effectively engage them” (McGlynn, p. 21). Teacher should learn about technology that adapt every day in order to meet changing need of students. Teacher need to observe the interactions and behaviors of students. Murphy (2010) argued that educators must face challenge firmly and fairly. Teachers should realize the learning environment. Teachers should teach students to use technology to improve their learning.

Teachers need to know the relationship between these two subjects, so they can motivate student to learn more. According to the reveal the teachers’ proficiencies and practices toward ICT (T.S. Safitry, T. Mantoro, M.A. Ayu, I. Mayumi, R. Dewanti and S. Azmeela, 2015 p. 12)

Table 1: Software Usage (T.S. Safitry, T. Mantoro, M.A. Ayu, I. Mayumi, R. Dewanti and S. Azmeela 2015, p.12)

Software Usage	Proficiency (%)			
	<i>Excellent</i>	<i>Good</i>	<i>Fair</i>	<i>No capability</i>
Word Processor	.5	.20	.45	.30
Spreadsheet	.5	.25	.30	.40
Presentation Software	.5	.25	.30	.40
Web Browser		.20	.20	.60
Search Engines	.5	.10	.35	.50
E-mail	.5	.30	.31	.55
Arts		.10	.20	.70

The results show that there are 45% of respondents who should be have fairly used Word Processors such as MS. Word, 30% have no capacity, 20% have good capacity and 5% excellent capacity in using software.

Spreadsheet Software such as Excel, most of the representation have about 40% having no capacity in using that, 30% have fair proficiency, 25% good proficiency and 5% who have excellent proficiency.

There are presentation software such as PowerPoint 40% respondents have no capacity, 30% have fair capacity, 25% have good capacity, and 5% have excellent proficiency. Web Browser about 60% have no capacity in using this; around 20% have good and fair capacity. For Search Engines there are 50% who have no capacity, 35% with fair capacity, 10 % good capacity and 5% excellent capacity. For using E-Mail, 55% having no

capacity, 31% have fair proficiency, 30% have good capacity and 5% have excellent capacity. The last is using art software such as Paint or Photoshop, 70% respondent have no capacity, 20% have fair proficiency and 10% have good capacity. The problem occurs because they lack knowledge on how to apply the software and technical support.

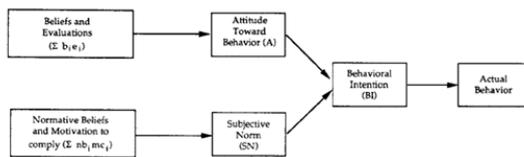


Figure 1: The Theory of Reasoned Action Model (TRA)

Source : Davis, Bagozzi and Warshaw, 1989

Since the Theory of Reasoned Action (TRA) and the Technology Acceptance Model (TAM) are the most widely use model to study actual behavior as the behavioral intention. This study adopted TAM and TRA based on intention to use technology.

The Theory of Reasoned Action (TRA), Fishbein and Ajzen suggested that a person’s actual behavior could be determined by considering his or her prior intention along with the beliefs that the person would have for the given behavior (Davis, 1985). Ajzen & Fishbein (1980) point out that behavioral intention could be determined by considering both the attitude that a person has towards the actual behavior. They defined the attitude towards a given behavior as a person’s positive or negative feeling about their actual behavior. Attitude is also determined by their perceptions about the expected consequences

of performing behavior. Therefore, the primary concern is to identify the factors that it change behavioral intention. Davis (1989) also proposed a technology acceptance model.

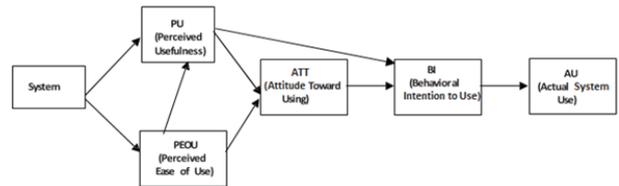


Figure 2: Technology Acceptance Model (TAM)

Source : Davis, Bagozzi and Warshaw, 1989, p.985

TAM claims that, Perceived Ease of Use (PEOU) and Perceived Usefulness (PU) are two determinants of user acceptance of technology (Davis, 1989). TAM claims that PU will be influenced by PEOU. The users find technology “easy to use”. They perceived the technology is useful. When there are two fundamental technology constructs (PEOU and PU), they constructs Attitude toward using (ATT), Behavior of Intention to Use (BI) and Actual Use (AU). ATT is defined as “as individual’s positive or negative feeling about performing the targets behavior” (Fishbein & Ajzen 1975, p.216) According to TAM, both PEOU and PU influence the users’ attitude toward technology. If the user finds the technology useful and easy to use, they will develop positive attitudes toward the technology. Researchers have tried to find the relationship between two programs. If researcher find the correlation coefficient strength, the coefficient is significant. If System Quality (SQ) is the external environmental measure such as practice (PU), apply the software, they can

understand the lessons and will have positive attitude which refer to ATT, they will have the knowledge to use the software as suggested by AU.

Purposes

The purpose of the research is to study the relationship between two variables by using correlation coefficient.

Hypothesis

H0: There are no relationship between value of MS. Word and MS. Excel

H1: The value of MS. Word has positive relationship with MS. Excel

Benefits of Research

The researcher developed model as a base for Technology Acceptance Model (TAM), which depended on attitude toward using. This study has constructed two variables such as Perceived Usefulness and Perceived Ease of Use. They influenced the Attitude toward the learners, which is used by TAM. If the learner find the technology is useful and easy to use, They will develop positive attitude toward technology. Learners would like to learn more. Because of Perceived Usefulness, Perceived Case of Use, the learners have the power to predict intention to learn. We apply this theory via smart phone. Students learn from new features, which will be challenged by the education. It will improve teaching efficiency, and enhance students learning experiences.

Research Process

A pilot study was first conducted to improve the structure and content. The university has 1,000 students enrolled in this programs. Of this group 45.1% of students are male and 54.9% are female. Thus, the target sample size for students was 278, which was necessary to obtain a confidence interval of 5 at a confidence level of 95%. The actual sample size use in the study 284 students, which were sufficient to meet this target sample size. This research used simple Correlation Analysis to analyze the data collections. The steps process is preparing data for a random sample. The researcher collected data for a period of 10 months between June 2013 to March 2014. This was the method process, the first collected scores come from one programs for 5 months. Second lasting for five months, researcher collected scores from another program. After the data was collected, the researchers analyzed the data through statistic tools.

Population and Sample

The target population of this study was undergraduate students who major in Business Computer at Siam University. The researcher collected data for 284 respondents as shown in table 7

Instruments

After researchers removed missing value and outliers, remaining respondents were prepared in the following manners: The accuracy of data entry in an SPSS version 20

statistical work sheet was checked using a random sample of 10 percent of respondents.

Data Analysis

The Statistical program was used to analyze the data which includes frequency distribution, correlation coefficient and ANOVA. Researcher defined correlations analysis by following formula

$$r_{xy} = \frac{S_{xy}}{\sqrt{S_{xx} S_{yy}}} \quad \text{whereas } i = 1, 2, \dots, n$$

$$S_{xy} = \sum_{i=1}^n x_i y_i - \frac{\sum_{i=1}^n x_i \sum_{i=1}^n y_i}{n}$$

$$S_{xx} = \sum_{i=1}^n x_i^2 - \frac{\left(\sum_{i=1}^n x_i\right)^2}{n}$$

$$\text{and } S_{yy} = \sum_{i=1}^n y_i^2 - \frac{\left(\sum_{i=1}^n y_i\right)^2}{n}$$

r_{xy} is positive indicates that value of MS. Word and MS. Excel move in the same direction.

r_{xy} is negative indicates that value of MS. Word and MS. Excel move to opposite direction.

r_{xy} is -1, 1 indicates that value of MS. Word is absolutely value of MS. Excel.

r_{xy} is 0, indicates that no relationship between value of MS. Word and MS. Excel.

r_{xy} close to 1 indicates that value of MS. Word is strong linear relationship with MS. Excel.

r_{xy} close to -1 indicates that value of MS. Word have negative decrease in MS. Excel.

r_{xy} close to 0 indicates that value of MS. Word is weak linear relationship with MS. Excel.

Table 2 : Students take examination MS. Word and MS. Excel

Software	No. of Students		On The amount of Total
	Pass	Fail	
MS. Word	121	36	157
MS. Excel	37	23	270

Table 2 shows students who take examination MS. Word on the amount of 157 respondents, 121 Students passed whereas 36 Students failed. The students who take examination MS. Excel is 270 students, 37 Students passed whereas 23 students failed.

Table 3 : Examination results comparing MS. Word with MS. Excel

MS. Word	MS. Excel	
	Pass	Fail
Pass	129	70
Fail	53	50

Table 3 summarized students who pass MS. Word examination is 129 respondents. 70 Students failed to take MS. Excel and 53 Students failed to take MS. Word. 50 Students failed to take MS. Excel. We concluded that the percentage of students who failed in MS. Excel more than MS. Word.

Table 4 : Scores of students

Software	No. of Students Presence for Exam	Mean	Std. deviation
MS. Word	284	406.62	394.533
MS. Excel	284	291.88	313.801

Table 4 summarized the mean of students who take examination of MS. Word, get mean at 406.62. It is more than students who take examination MS. Excel.

Table 5 : The relationship between MS. Word and MS. Excel

Software and Sig	Correlation Coefficient
MS. Word and MS. Excel	0.749
Sig (2 tailed)	0.000

From Table 5 the correlation coefficient MS. Word and MS. Excel are 0.749 at Significant Correlation 0.000. The Sig (2-tailed) value is less than 0.05. Therefore a statistical significant correlation between scores of two programs elasticity.

Whether MS. Word impact on MS. Excel, the following hypotheses are offer
 H_0 : There are no relationship between value of MS. Word and MS. Excel
 H_1 : The value of MS. Word has positive relationship MS. MS. Excel

According to model significance, correlation (2-tailed). It is less than α which the value is 0.05. Hypothesis H_0 is rejected. Therefore the value of MS. Word has positive relationship with MS. Excel at significance 0.05

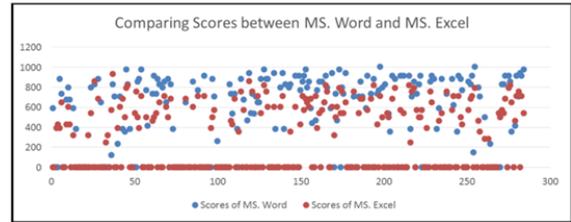


Figure 3: Comparing Scores between MS. Word and MS. Excel

From Figure 3 shows comparing scores between MS. Word and MS. Excel. Most of students who get higher score in MS. Word, they may get higher scores in MS. Excel or vice versa.

Table 6: Linear Regression Analysis of MS. Word and MS. Excel

Variables	b	SE _b	β	t	P
Constant	131.718	21.235		6.203	.000
MS. Excel	0.942	0.050	0.749	18.990	.000

$$SE_{est} = 261.82, R = .749, R^2 = .561, F = 360.63, p = .000$$

From Table 6 shows The Linear Regression Analysis of MS. Word and MS. Excel. The result shows that the adjusted R^2 model is 0.560 with the R^2 0.561 means that the line regression explains 56.1% of the variance of MS. Excel. F-test has the null hypothesis that there is no linear relationship between the two variables (in other words $R^2 = 0$). A Simple linear regression was calculated to predict MS.

Word based on MS. Excel. A significant regression was found ($F(1, 282) = 360.629, p < .000$ and 283 degree of freedom the test is highly significant, thus the researcher can assume that there is a linear relationship between the variables in the model. The regression estimates the linear regression function to be $MS. Word = 131.718 + 0.942$ (MS. Excel).

Data Collection

284 respondents completed the survey of 128 (45.1%) were male and 156 (54.9%) were female. All of respondents were at the age range of 20-25. The descriptive statistics of the respondents' demographics are presented in Table 7

Table 7: Demographics (Gender and Age Range)

Variables	Total	Percent
Gender		
Male	128	45.1%
Female	156	54.9%
Age Range		
20-25	284	100%

Conclusion

According to the research, significance correlation (2-tailed) is 0. The correlation is less than $\alpha 0.05$. Hypothesis H_0 is rejected. Therefore the value of MS. Word has positive relationship with MS. Excel at significance 0.05. Our study examines Statistical-based on Correlation Coefficient. The Sig (2-tailed) value is less than or equal to 0.05. It indicated that there is a statically significant between two

variables. That means, increases in one variable do significantly relate to increases in second variable or vice versa. The statistic was evaluated with hypothesis significant (2 tailed) is 0. It is less than $\alpha 0.05$. There is a statistically significant correlation between two programs. According to this hypothesis, H_0 is rejected. We accepted H_1 which the value of MS. Word has positive relationship with MS. Excel. The result of r_{xy} close to 1, indicates that value of MS. Word is strong linear relationship with MS. Excel. It moves in the same direction. Students who take examination with MS. Word have knowledge enough to take examination with MS. Excel.

Recommendation

The findings of the present study can be used to improve academic learning. However absent students who missed classes, they were also got zero scores. Some students absented from Pretest so they failed. They cannot take MS. Word or MS. Excel Examination. Teachers should summarize the contents to students before they take final examination. The study is also considered to be an analytical descriptive study in order to examine the relationship between variables. Perceived usefulness, perceived ease of use which have effects on the attitude. Linear Regression Analysis and ANOVA will be conducted the relationship between variables. This research aim to study the relationship between two variables by using correlation coefficient. This model need to investigate the factors that affecting on students' attitude to use technology in order to learn more. This

research use TAM model as a theoretical framework. Future research should develop lessons through Architecture Intelligent or Android environmental system in order to improve academic achievement. They need to identify and investigate the factors that affecting on students' attitude towards mobile learning. They can develop external variables to propose new model.

Acknowledgements

I would like to express my deepest appreciation to all those who provided me the possibility to complete this research especially my supervisors Dr. Dechanuchit, Mr. David and Prof. Dr. Graham which their enthusiasm and endeavours to motivate me to do the research. Finally, I would like to thank two anonymous reviewers for their recommendation that led to substantial revisions of the article, for which I remain solely responsible.

References

Alharbi Saleh, Drew Steve. (2014). Using the Technology Acceptance Model in Understanding Academics' Behavioural Intention to Use Learning Management Systems. **International Journal of Advanced Computer Science and Applications (IJACSA)**, 5(1).

Al-hawari Ahmad Mohammad and Mouakket Samar. (2010). The influence of Technology acceptance model (TAM) factors on students' e-satisfaction and e-retention with the context of UAE e-learning. Education, **Business and Society: Contemporary Middle Eastern**

Issues, 3(4), 299 – 314.

- Al-Rahmi Mugahed Waleed, Othman Shahizan Mohd. The Impact of Social Media use on Academic Performance among university students: A Pilot Study, **Journal of Information Systems Research and Innovation**. Retrieved on February 29, 2016 from <http://seminar.utmspace.edu.my/jjisri/>
- Arntzen Bechina Aurelie Aurilla, Worasinchai Lugkana and Ribi re M. Vincent. (2009). An insight into knowledge management practices at Bangkok University, **Journal of Knowledge Management**, 13(2), 127-144.
- Casimir Gian, Ng Keith Ngee Yong and Cheng Paul Liou Chai. (2012). Using IT to share knowledge and the TRA. **Journal of Knowledge Management**, 16(3), 461-479.
- Chuttur, Mohammad. **Overview of the Technology Acceptance Model: Origins, Developments and Future Directions. Sprouts: Working Papers on Information Systems**. Retrieved on February 29, 2016 from <http://sprouts.aisnet.org/9-37>.
- Confield, Jack. **100 Ways to Enhance Self-Concept in the Classroom a Handbook For Teacher and Parents**. Englewood Cliffs, N.F. Prentice-Hall.
- Fathema Nafsaniath, Shannon David and Ross Margaret. (2015). Expanding The Technology Acceptance Model (TAM) to Examine Faculty Use of Learning Management Systems (LMSs) in Higher Education Institutions. **Journal of Online Learning and Teaching**, 11(2), 210-232.

- Huang, Yueh-Min, Chiu, Po-Sheng. (2015). The Effectiveness of Meaningful Learning Based Evaluation Model for Context-Aware Mobile Learning. **British Journal of Educational Technology**, 46(2), 437-447.
- J. Henderson Allan. (2004). **The e-learning Question and Answer Book**. AMACOM Publishing: The United States of America.
- Liz, Wilmes. (1991). **Learning Centers: Elgin Ill Building Blocks Publication**.
- Nair Indu and Das Mukunda V. (2012). Using Technology Acceptance Model to assess teachers' attitude towards use of technology as teaching tool: A SEM Approach. **International Journal of Computer Applications**, 42(2).
- Noesgaard, Signe Schack; Orngreen, Rikke. (2015). The Effectiveness of E-Learning: An Explorative and Integrative Review of the Definitions, Methodologies and Factors that Promote e-Learning Effectiveness. **Journal Electronic Journal of e-Learning**, 13(4), 278-290.
- Noprakert, Paitoon. (2015). **Learning Management System**. Retrieved on March 4, 2016 from http://www.Krupaitoon.com/articles.php?article_id=1
- Park Namkee, Lee Min Kwan and Cheong Hope Pauline. (2008). University Instructors' Acceptance of Electronic Courseware: An Application of the Technology Acceptance Model. **Journal of Computer-Mediated Communication**, 13, 163-186.
- Park Youl, Sung. (2009). An Analysis of the Technology Model in Understanding University Students' Behavioral Intention to Use e-Learning, **Educational Technology & Society (IFETS)**, 12(3), 150-162.
- Saadè George Raafat, Nebebe Fassil and Tan Weiwei. (2007). Viability of the "Technology Acceptance Model" in Multimedia Learning Environments: A Comparative Study, **Interdisciplinary Journal of Knowledge and Learning Objects**, 3, 175-184.
- Sánchez Arteaga R., Hueros Duarte A. (2010). Motivation factors that influence the acceptance of Moodle using TAM. **Journal Computer in Human Behavior**, 26(6), 1632-1640.
- Sohaei Shamila, lahad A. Noorminishah. Review on Social Network Sites for Teaching and Learning, **Journal of Information Systems Research and Innovation**. Retrieved on February 26, 2016 from <http://seminar.utmspace.edu.my/jisri/>.
- Supakdee, Prajuab. (2015). **Classroom Based Learning**. Retrieved on March 1, 2016 from <http://www.school.net.th/library/create-web/10000/generality/10000-11019.html>.
- Titleston, DonnaWalker. (2005). **10 Best Teaching Practices: How Brain Research**. Thousand Oaks, CA: Corwin Pr.
- Welsh, Hilarie B. (2015). At Issue: An Award-Winning Community College Instructor's Approach to Teaching and Learning. **Journal The Community College Enterprise**, 21(1), 66-78.
- Wilson, Hope E. (2015). Patterns of Play Behaviors and Learning Center Choices Between High Ability and Typical

Children. **Journal of Advanced Academics**, 26(2), 143–164.

Wong Kung-Teck, Osman bt Rosma, Goh Choo Swee Pauline and Rahmat Khairezan Mohd. (2013). Understanding Student Teachers' Behavioral Intention to Use Technology: Technology Acceptance Model (TAM) Validation and Testing. **International Journal of Instruction**, 6(1), 89-104.