Study of Web-based Learning and Auxiliary Training with Vocational College Students in Applied Technology Acceptance Model

Shue-Tien Juang ¹, Chien-Chung Lin², Yao-Ming Chu³ Rong-Jyue Fang⁴ Sung-Shan Chang ⁵
¹ Instructor, Department of Business Administration, Mei-Ho Institute of Technology, Taiwan
² Professor, Graduate Institute of Business Management, Mei-Ho Institute of Technology, Taiwan
³ Associate professor, Department of Industrial Technology Education, National Kaohsiung Normal University, Taiwan
⁴ Chair Professor, Department of Information Management, Southern Taiwan University of Technology, Taiwan
⁵ Graduate student, Department of Industrial Technology Education, National Kaohsiung Normal University, Taiwan

*jst0616@gmail.com, Gendion.lin@gmail.com
t1179@nknucc.nknu.edu.tw
rxf26@yahoo.com.tw
sushch6@gmail.com

Abstract: - This study proposes the theories of the electronic learning and technology acceptance model to help promote acceptance rate of web-based learning and auxiliary training for technical and vocational college students. The study discusses the external factors, perceived ease of use, perceived usefulness, satisfaction toward e-learning tools and intention of use. A survey was conducted with technical and vocational college students, and 400 effective samples were received. The findings are as follows: (1) The perceived ease of use shows positive correlations with “frequency of internet use” and “function and interaction of web-based learning” (2) The perceived usefulness shows positive correlations with “frequency of internet use” and “function and interaction of web-based learning.” (3) The perceived ease of use has a positive correlation with the perceived usefulness. (4) The perceived ease of use shows positive correlations with outcomes of using e-learning tools, content of e-learning tools and overall satisfaction. (5) The perceived usefulness has a positive correlation with the intention of use. (6) The intention of use shows positive correlations with outcomes of using e-learning tools, content of e-learning tools and overall satisfaction. (7) The perceived usefulness and overall satisfaction of using e-learning tools have a significant effect on intention of use with a predicted loading of 47.7%. Intention of use and overall satisfaction are the most influential factors. Therefore, the research suggests special emphasis on the enhancements of learners’ self-efficacy on the internet and of the interaction between the instructor and the student body in activities. The options of web-based learning and auxiliary training can make this process more flexible, and thus the features of e-learning and its goal can be maximized.

Key-Words: Technology Acceptance Model (TAM), Web-based Learning, Auxiliary Training, Vocational College
1 Introduction
During the new Knowledge Economy, the rising and flourishing of the Internet successfully promote Web-based learning and allow it in becoming a significant and flexible learning environment. It requires the students to participate the activities on their own initiatives to bring up their own pace to learn. This study discusses the theories of web-based learning and technology acceptance model while investigating the acceptance of the web-based learning and auxiliary training theories of college students. The participating students come from the night school division and the weekend school division of the institute of technology of which this study bases. The e-leaning system would record complete learning comportment of the students to press both the teachers and the students. As a result, the students could build up a self-learning system through e-learning.

This study requires the e-learning system and the courses offered by the case Institute in order to probe e-learning. By TAM, this study is to prove the learning effects of the teachers and the students in using the systems of e-learning and auxiliary training. The data of this study includes the students participated in the e-learning. The external factors or independent variables are: (1) frequency of internet use (2) function and interaction of web-based learning as the intervening variable in the correlation among “perceived usefulness,” ”perceived ease of use,” and “satisfaction toward e-learning tools”. Finally, the researchers probe the dependent variables (intention of use) through the intervening variable as a reference for the related institutes or schools to carry out the e-learning in the future.

Davis proposed the TAM (Technology Acceptance Model) in 1989 [6]. It is suitable for explaining the effects caused by the attitude and behavioral intention of the users of the computer. It connects the usefulness, ease of use, the attitude of the users and the intention of use of the users with the actual computer usage behavior. The TAM presumes that the perceived usefulness and the perceived ease of use would affect the behavioral intention of the user through their attitude and satisfaction toward e-learning tools. Davis proposed the TAM (Technology Acceptance Model) in 1989[6]; the TAM mainly probes the relationship among the perceived usefulness (U), the perceived ease of use (EOU) and the behavior intention (BI) of the information system and the users. In addition, Davis proved that the intention of the people who use computer can be validly predicted, the usefulness, the ease of use, and the external factors are the main factors that affect the intention of computer users.

New e-learning mode is more flexible for the students in the choice of time, space and study pace [9]. Si--Wei Zhou [8] pointed out that the learners think Internet technology is helpful to them not only in making the learning hours and places more flexible but also in arranging the learning progress according to the abilities of the user. E-learning and mobile learning offer methods which decrease the limitations of traditional education. [9].However, Adams [1] et al. in 1992 believes the external factors of the web-based learning and acceptance level of the learners would directly influence the learners to a certain degree. Thus, this study presumes that the frequency of internet use, function and interaction of web-based learning are the external factors that affect e-learning.

2 Literature Review

3. Research Design
3.1 Research framework

According to literary reviews, TAM mainly probes the users’ acceptance model to the information system. This study uses Mei Ho Institute of Technology in Ping-Tung, Taiwan as a case example. The case investigates the satisfaction toward e-learning tools from the students’ viewpoints, and these two variables will influence acceptance of technology usage, and in turn influence intention of use.

As a result, the survey of the proposed e-learning was conducted in the class of the institute. Based on the TAM mode, the development of the questionnaire mainly referred to the essay of Moon and Kim [7]. The research framework of this study is as follows: Fig. 1

![Fig. 1 The frame of research](image)

3.2 Methodology

In this study, the external factors are frequency of internet use and function of the web-based learning. The intervening variables are perceived usefulness, perceived ease of use and satisfaction toward e-learning tools.

The variables mentioned above are measured according to the Likert-type scale. The five options are: 5 for "strongly agree", 4 for "agree", 3 for "undecided", 2 for "disagree" and 1 being "strongly disagree".

4. Results and Discussion

4.1 Data analysis of the sample

2/3 of e-learning programs provided by the case Institute are conducted by Internet. Those taking e-learning programs are either night school division or weekend school division in the case Institute. Due to the constraint of time and cost, the participants in this study are those who take distant courses in the semester of 2008. The e-learning system this study uses is the e-learning platform offered by the case Institute. The researchers received 400 on-line questionnaires. The findings show:

- 91% of the learners believe e-learning makes their time more flexible and enables them to adjust their learning progress every week.
- 91% believe they can adjust the difficulties of e-learning content in light of their learning situation.
- 92% agree e-learning helps them learn, and they have good learning result. Therefore, they would like to recommend others to attend web-based learning curriculum.
- 90% believe the experience of e-learning can affect their own learning effects.
- 90% believe in comparison with traditional instruction, they can learn more effectively via e-learning.
- Approximately 92% express e-learning can double learning results.

4.2 Instrument, and its validity and reliability

The questionnaires in this study are composed of 2 parts. The first part is personal data (containing the external factors and experience related to e-learning). The second part deals with investigation of respondents’ opinions.

In order to establish construct validity, factor analysis was conducted. The software of SPSS was used, and principal components analysis and least oblique method were employed as well. Among them, the variable of intention of use was considered one factor; perceived ease of use and the use of a computer were regarded as one factor based on factor analysis; outcomes of using e-learning, contents of e-learning...
tools, and overall satisfaction were considered one factor 「satisfaction toward e-learning tools」 based on factor analysis. Therefore, the second part of this questionnaire contains 7 factors, perceived ease of use, perceived usefulness, web-based learning effect, web-based learning content, overall satisfaction, intention of use, and experience of using a computer.

The researchers set up validity of the second part of this questionnaire; every factor loading is above 0.8. By using of Cronbach $\alpha$ Coefficient, every $\alpha$ Coefficient value in all of the factors is above 0.7. Therefore, all the reliabilities reached the acceptable level.

### 4.3. Hypotheses

According to the results of factor analysis, the researchers discuss intermediary variable (the relationship among usefulness, perceived ease of use and satisfaction toward e-learning tools by regarding external factors (frequency of internet use, function of the web-based learning) as independent variables. Then, the researchers discuss the relationship of dependent variable (intention of use) by using usefulness, perceived ease of use and satisfaction toward e-learning tools is independent variable (See Table 1).

<table>
<thead>
<tr>
<th>Table 1 Hypotheses</th>
</tr>
</thead>
<tbody>
<tr>
<td>H1-1a: The frequency of internet use of external factors has a significant effect on perceived ease of use.</td>
</tr>
<tr>
<td>H1-1b: The function and interaction of web-based learning external factors has a significant effect on perceived ease of use.</td>
</tr>
<tr>
<td>H1-2a: The external factors on frequency of internet use have a significant effect on usefulness.</td>
</tr>
<tr>
<td>H1-2b: The external factors of function and interaction of web-based learning have a significant effect on usefulness.</td>
</tr>
<tr>
<td>H2: The perceived ease of use has a significant effect on usefulness.</td>
</tr>
<tr>
<td>H3a: The perceived ease of use has a significant effect on the outcomes of using e-learning and satisfaction toward e-learning tools.</td>
</tr>
<tr>
<td>H3b: The perceived ease of use has a significant effect on the contents of e-learning tools of satisfaction toward e-learning tools.</td>
</tr>
<tr>
<td>H3c: The perceived ease of use has a significant effect on the overall satisfaction of satisfaction toward e-learning tools.</td>
</tr>
<tr>
<td>H4a: The usefulness has a significant effect on outcomes of using e-learning of satisfaction toward e-learning tools.</td>
</tr>
<tr>
<td>H4b: The usefulness has a significant effect on contents of e-learning tools of satisfaction toward e-learning tools.</td>
</tr>
<tr>
<td>H4c: The usefulness has a significant effect on the overall satisfaction of satisfaction toward e-learning tools.</td>
</tr>
<tr>
<td>H5: The usefulness has a significant effect on intention of use.</td>
</tr>
<tr>
<td>H6a: Outcomes of using e-learning of satisfaction toward e-learning tools have a significant effect on intention of use.</td>
</tr>
</tbody>
</table>
H6b: The content of web-based learning of satisfaction toward e-learning tools has a significant effect on intention of use.

H6c: The overall satisfaction of satisfaction toward e-learning tools has a significant effect on intention of use.

H7: External factors, perceived ease of use, using usefulness, and satisfaction toward e-learning tools have a significant effect on intention of use.

4.4 Testing and verifying the theory of Technology Acceptance Mode

Correlation analysis and stepwise regression were used to test and verify hypotheses using the software of SPSS. The results are as follows:

4.4.1 Correlation analysis test and verification of hypotheses

- The external factors have a significant effect on perceived ease of use; therefore, H1-1a, H1-1b are established. R=0.336** ; R=0.685**
- The external factors have a significant effect on using usefulness; therefore, H1-2a, H1-2b are established. R=0.349** ; R=0.661**
- The perceived ease of use has a significant effect on using usefulness; therefore, H2 is established. R=0.880**
- The perceived ease of use has a significant effect on satisfaction toward e-learning tools; therefore, H.3a, H3b, H3c are established. R=0.731** ; R=0.740**; R=0.708**
- The application usefulness has a significant effect on satisfaction toward e-learning tools; therefore, H.4a, H4b, H4c are established. R=0.788** ; R=0.785**; R=0.767**
- The application usefulness has a significant effect on intention of use; therefore, H5 is established. R=0.880**
- The external factors have a significant effect on perceived ease of use; therefore, H1-1a, H1-1b are established. R=0.336** ; R=0.685**
- The satisfaction toward e-learning tools has a significant effect on intention of use; therefore, H.6a, H6b, H6c are established. R=0.595** ; R=0.645**; R=0.672**

4.4.2 Stepwise regression analysis test and verify hypotheses

- External factors, perceived ease of use, application usefulness, and satisfaction toward e-learning tools all exhibit a significant effect on intention of use; therefore, H.7 are established. \( R^2=0.477*** \);

\[ \Delta R^2=0.473*** \]

The significance of the total regression equation reached \( p<0.001 \). The regression coefficients of the application usefulness and overall satisfaction are all significant. According to the regression coefficients, the explanation for intention of use ordered overall satisfaction and application usefulness as first and second respectively. The two variables mentioned above can explain 47.7% of the total variation of intention of use.

The Durbin-Watson value is set at 2.432, showing that the difference is not against our hypotheses. VIF value is 1.000–1.854, meaning that there is no collinear existing among variables [3].

5. Conclusions and Suggestions

The researchers propose the conclusions and the suggestions for this study as follows:

- The perceived ease of use and perceived
usefulness both show positive correlations with “frequency of internet use” and “function and interaction of web-based learning”.

- The perceived ease of use has a positive correlation with the perceived usefulness.
- The perceived ease of use and perceived usefulness both show positive correlations with outcomes of using e-learning tools, content of e-learning tools and overall satisfaction.
- The perceived usefulness has a positive correlation with the intention of use.
- The intention of use shows positive correlations with outcomes of using e-learning tools, content of e-learning tools and overall satisfaction.
- The perceived usefulness and overall satisfaction of using e-learning tools have a significant effect on intention of use with a predict loading of 47.7%. Intention of use and overall satisfaction are the most influential factors.

The researchers made use of TAM mode to analyze the related variables of e-learning. It should be pointed out that there are still important and influential factors worth discussing in the aspect of technology-based teaching. For example, teachers’ perspective of this mode is crucial as well, particularly that of the instructors’ instant feedback and their confirmation towards this technologically initiated learning environment. At the same time, instructors should provide feedbacks for the users of their progress every so often over the length of the course. This research finds that perceived usefulness and overall satisfaction have much more influential effect on intention of use. According to the current satisfaction of instructors teaching method of college students participating in web-based learning courses, the statistics show that the approval rate is over 90%. Therefore, the research suggests special emphasis on the enhancements of learners’ self-efficacy on the Internet and of the interaction between teachers and students in activities. The e-learning application will become more and more in demand with the development of information sharing and communication technologies and this application will be the frontier of excellent teaching assistance. There are web-based learning and auxiliary training that allow more flexibility for a teaching environment and room for more advance development and a more thorough system. As a result of these developments to come; the features of e-learning and its goal can be maximized.

References:


[6]. Davis, F.D. Davis Jr., “Perceived usefulness, perceived ease of use, and user acceptance of...
information technology, ”MIS Quarterly 13 (3), pp. 319-340, 1989


