PERCEIVED ADVANTAGES IN THE USE OF E-EXAMS – COMPARATIVE TAM-MODEL STUDY AMONG STUDENTS AND TEACHERS

Heli Aramo-Immonen¹, Kirsi Liikamaa², Alberto Michele Felicetti¹

¹ Tampere University of Technology (FINLAND)
² Turku University (FINLAND)

Abstract

Exploratory survey about the transformation from traditional examinations to e-exams. This study was conducted among the higher education students and teachers in technical university and business school in Finland. We wanted to find out the perceived usefulness and ease-of-use of e-exam system among students and teachers. Furthermore, we wanted to compare the attitude and acceptance rate of students and teachers towards the new system. The research was conducted in the phase where there was still possibility to choose between traditional examination in lecture hall with pen and paper and novel electronic examination.

Keywords: TAM, e-exam, self-efficacy, cost-benefit paradigm, higher education.

1 INTRODUCTION

Exploratory survey about the transformation from traditional examinations to e-exams. This study was conducted among the higher education students and teachers in technical university and business school in Finland. We wanted to find out the perceived usefulness and ease-of-use of e-exam system among students and teachers. Furthermore, we wanted to compare the attitude and acceptance rate of students and teachers towards the new system. The research was conducted in the phase where there was still possibility to choose between traditional examination in lecture hall with pen and paper and novel electronic examination.

We used Technology Acceptance Model (TAM) from information technology theory [1]. The model suggests that when users are presented with a new technology (here e-examination), a number of factors influence their decision about how and when they will use it. TAM model [1] distinguishes perceived usefulness (PU) and perceived ease-of-use (PEOU).

In our study we assessed PU and PEOU among students in their studies and among teachers in their work. The four research arguments were: (1) The PU among students; The degree to which a student believes that using an e-exam system would enhance his or her learning outcomes and students perceived advantages in education process. (2) The PEOU among students; The degree to which a student believes that using an e-exam system would be free from effort. (3) The PU among teachers; The degree to which a teacher believes that using an e-exam system would enhance his or her work performance. (4) The PEOU among teachers; The degree to which a teacher believes that using an e-exam system would be free from effort.

In the conceptual part of the paper we discuss the acceptance of the new system based on self-efficacy theory [2] and cost-benefit paradigm from behavioral decision theory (Payne 1989). Finally, we introduce the statistical calculation based on TAM-model, and explain the result. We suggest further research ideas, such as comparative international study among Italian respondents and possible use of more advanced extended TAM models with external variables.

2 EXAM

In this study we investigated EXAM system used among Master level students in Tampere University of Technology. EXAM Electronic examinations differ from paper-based examinations in terms of invigilation and other arrangements. Generally, student conduct is governed by stricter regulations during electronic examinations than paper-based examinations. When taking an electronic exam a student follows the rules concerning the electronic exam. There are available instructions guide and training how to use system in advance. The Guidelines For Electronic Skills Demonstrations and the supplementing instructions are presented in this guide and training session. All students are expected
to follow these instructions carefully from the moment they enter the electronic examination centre. Strict silence must be observed at all times. Even if your exam has not yet started conversation with other students is not allowed.

As a facility there are special centrally controlled PC rooms to take the exams. The room features recording surveillance cameras. The examination services may monitor potential cases of disturbance or cheating in real time. Computers are not connected to www and they are customized with following software: Notepad, Paint, calculator, pdf-reader, Excel, Word, 7-zip, Matlab, Pycharm. There is also Java + Eclipse -environment available (in special cases). Some of the computers are equipped with pen tablets. (extracted from TUT user guide for electronic skills demonstrations)

3 METHODOLOGY

We used Technology Acceptance Model (TAM) from information technology theory [1, 4]. The model suggests that when users are presented with a new technology (here e-examination), a number of factors influence their decision about how and when they will use it. TAM model [1] distinguishes perceived usefulness (PU) and perceived ease-of-use (PEOU) (see Figure 1.).

![Figure 1. Davis's TAM-model [1].](image)

H1: Perceived usefulness will exhibit a significant positive direct relationship with the actual usage of the E-EXAMS.

H2: The effects of perceived ease of use on actual system use will be significant and positive but mediated by perceived usefulness.

H3: Perceived ease of use will exhibit a smaller but significant positive direct relationship with actual E-EXAMS usage when perceived usefulness is controlled for.

H4: Perceived usefulness and perceived ease of use will have a significant combined positive relationship with the actual usage of the E-EXAMS.

The "external variables" constructs are also not included in the research model since there is no immediate intention to investigate antecedents to perceived usefulness and ease of use.

Perceived ease of use and perceived usefulness were measured using widely used seven item measurement scales, ranging from extremely likely to extremely unlikely.

Six items were used to measure perceived ease of use, six items to measure perceived usefulness and one item to measure user selfreported system usage. Thirtyfour usable responses were found to constitute an acceptably representative sample (Money and Turner, 2004).
We used the SPSS software to calculate Cronbach Alpha measurement scale reliability coefficients for each construct. Results are shown in Table 1. The results confirm the internal consistence of the considered sample.

**Table 1. Cronbach Alpha values.**

<table>
<thead>
<tr>
<th>Construct (Items)</th>
<th>Cronbach Alpha</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perceived usefulness (6 items)</td>
<td>.946</td>
</tr>
<tr>
<td>Perceived ease of use (6 items)</td>
<td>.959</td>
</tr>
<tr>
<td>Overall (12 items)</td>
<td>.958</td>
</tr>
</tbody>
</table>

TAM-model questions for testing EXAM e-examination [1].

1. I am Student/teacher
2. I am male/female
3. I have used EXAM / I have not used EXAM
4. Age

**Perceived usefulness (PU)**

1. Using EXAM in my job would enable me to accomplish tasks more quickly
2. Using EXAM would improve my job performance
3. Using EXAM in my job would increase my productivity
4. Using EXAM would enhance my effectiveness on the job
5. Using EXAM would make it easier to do my job
6. I would find EXAM useful in my job

**Perceived Ease of Use (PEU)**

7. Learning to operate EXAM would be easy for me
8. I would find it easy to get EXAM to do what I want it to do
9. My Interaction with EXAM would be clear and understandable
10. I would find EXAM to be flexible to interact with
11. It would be easy to me become skillful at using EXAM
12. I would find EXAM easy to use

Likert scale:
Likely Unlikely

| extremely | quite | slightly | neither | slightly | quite | extremely |

**4 RESULTS**

Due to the limited sample size, statistical analyses were limited to correlation and regression techniques.

Data were analysed using IBM SPSS Statistics 20. Correlation analysis results appear in Table 2 which includes the observed correlations and their associated “2-tail sig.” values.
Table 2. Correlation analysis result.

<table>
<thead>
<tr>
<th></th>
<th>Perceived Usefulness</th>
<th>Perceived ease-of-use</th>
<th>Actual use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perceived Usefulness</td>
<td>Pearson’s Correlation</td>
<td>1</td>
<td>.709**</td>
</tr>
<tr>
<td></td>
<td>2-tail sig.</td>
<td></td>
<td>.000</td>
</tr>
<tr>
<td>Perceived ease-of-use</td>
<td>Pearson’s Correlation</td>
<td>.709**</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>2-tail sig.</td>
<td></td>
<td>.000</td>
</tr>
<tr>
<td>Actual use</td>
<td>Pearson’s Correlation</td>
<td>-.124</td>
<td>-.141</td>
</tr>
<tr>
<td></td>
<td>2-tail sig.</td>
<td></td>
<td>0.486</td>
</tr>
</tbody>
</table>

From the result we found that there is Significant Correlation between PU and PEOU. However, no significant correlation between PU and ACTUAL USE. And no significant correlation between PEOU and ACTUAL USE.

5 CONCLUSIONS

Due to the limited sample size, statistical analyses were limited to correlation and regression techniques. Further research idea is to have bigger sample and regression analysis to be carried in order to find out if: (1) usefulness act as a mediator of the relationship between perceived ease of use and system usage? (2) Perceived usefulness and perceived ease of use will have a significant combined positive relationship with the actual usage of the E-EXAMS?

REFERENCES


