An Investigation of Factors Influencing Healthcare Workers’ Use and Acceptance of E-Learning in Post-School Healthcare Education

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Abstract. The objective of the study presented here was to perform an empirical investigation on factors affecting healthcare workers acceptance and utilisation of e-learning in post-school healthcare education. E-learning benefits are realised when key features of e-learning are not only applied, but deemed useful, compatible with the learning process and supportive in order to reach the overall goals of the learning process. We conducted a survey of 14 state-enrolled nurses and skilled-workers within the field of healthcare in Norway. The results show that perceived compatibility and subjective norm explain system usage of the e-learning tool amongst the students. We found that the fact that the students considered the e-learning to be compatible with the course in question had a positive effect on e-learning tool usage. We also found support for factors such as facilitating conditions and ease of use leads to the e-learning tool being considered useful.

Keywords. online education, continuing medical education

1. Introduction

In the field of healthcare e-learning is seen as promising, because the field is always changing, and practitioners continuously need to update their knowledge. As Saade et al reports [1], the advantages of Internet-based learning have been widely recognised. Some of the reported advantages are flexibility and broader accessibility [2], improved students’ performance [3], reflective evaluation of the learning experience [4], and a higher computer self-efficacy [5].

New information technology, such as e-learning, represents innovation for the potential adopters (students). Therefore, much of the research on individuals’ adoption of information technology is originating from the diffusion of innovation literature, where individuals’ perceived characteristics of innovation (PCI) among other factors are posited to be significant influences on user acceptance [6–8]. Other models that explain the relationship between user perceptions, attitudes, use intentions and consequent system usage is the technology acceptance model (TAM) [9, 10], the theory

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of planned behaviour (TPB) [11], and the model of personal computer utilisation (MPCU) [12]. Recent work has tested these models to determine their explanatory power in explaining student acceptance of multimedia learning systems [1] and e-learning services [13].

This paper constitutes a continuation of the research stream of e-learning user acceptance where the technology acceptance model (TAM) has been used to assess student satisfaction using an e-learning tool. It provides insight on a growing number of users of relevance to the healthcare sector, namely persons already employed in the sector that needs to update their skills.

2. Conceptual Model and Hypothesis

The theoretical foundation of this conceptual model applied comes from combining earlier research in technology acceptance [9, 10], and consists of five factors: 1) Facilitating conditions [12] are objective factors in the environment that observers agree make an act easy to accomplish, 2) Perceived usefulness is defined as the degree to which a person believes that using a particular system would enhance his or her job performance [10], 3) Perceived ease of use is defined as “the degree to which a person believes that using a particular system would be free of effort” [9], 4) Perceived compatibility is “the degree to which an innovation is perceived as being consistent with the existing values, needs, and past experiences of potential adopters” [7], and finally 5) Subjective norm [11, 12] is the perception that people important to a subject influence the subjects intentions and actions (e.g., a teacher may influence a student).

The hypotheses are that all factors are positively associated with Current use and Future use intentions (see Figure 1).

![Figure 1. The conceptual model for the research. The hypothesis is that five factors influence the use and use intention of e-learning tool](image)

3. Research Method

The context for this study was 14 state-enrolled nurses and skilled-workers from central Norway. They were employed in different kinds of healthcare and enrolled in a post-school cancer treatment course that applied e-learning actively. The educational level of the subjects is mainly on the level of enrolled nurses (71.4%) and welfare worker (21.4%). The subjects were mainly female (92.9%). 64.3% currently worked as state enrolled workers, while 28.6% worked as skilled workers (social workers).

The e-learning tool used was delivered by Norwegian e-learning which is a small e-learning company established in 1997 with 6 employees. The e-learning tool used in this study provides: messaging to/from the teacher, study plan, assignments that
students could use to test themselves, teacher assignment evaluation, digital learning resources, and a digital library. The course was based on self-studies with some classroom meetings with the other students and the teacher.

Five independent variables (all using 5-point Likert scale) were included in this study: facilitating conditions, perceived usefulness, perceived ease of use, perceived compatibility, and subjective norm. The questionnaire was constructed using validated measurements scales from previous research. We translated the instrument into Norwegian and did a pre-test of the instrument on students and a teacher of the course. This led to slight rewording of some items to improve clarity.

Two dependent variables were examined; current system usage which measures successful system implementation for the students, and future use intention, which indicates the likelihood that the system will be applied by the students in the future (both subjective measures).

We conducted a survey on all members of the courses. A total of 14 questionnaires were distributed, and 14 usable responses were received (100%).

The reliability of the factors was evaluated by internal consistency analysis using coefficient alpha [6]. Six factors were reliable: Perceived Usefulness (PU): 0.922, Perceived Ease of Use (PEU): 0.950, Perceived Compatibility (PC): \( \alpha = 0.890 \), Subjective Norm Important (SNI): \( \alpha = 0.854 \), Facilitating Conditions Technology (FCT): \( \alpha = 0.711 \), Current Use (CU): \( \alpha = 0.738 \) and Future Use Intentions (FUI): \( \alpha = 0.612 \) (not reliable).

We evaluated the construct validity with VARIMAX rotation and found that the five independent variables capture 88.7% of the variance. The criterion related validity is calculated with multiple correlations \( (R) \) and shown in Table 1. Current use is correlating with perceived compatibility with an effect size of 0.61, which is considered a large effect size. There are only small correlation effects on future use intention.

### Table 1. Intercorrelations between independent and dependent variables. Notes: Pearson correlation coefficients are reported. ** Correlation is significant at the 0.01 level (2-tailed). * Correlation is significant at the 0.05 level (2-tailed)

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### 4. Results

We applied multiple regression analysis to further evaluate the relationships between the dependent variables and the independent variables, resulting in the revised explanation model presented in Figure 2. Since \( n = 14 \) is a small sample size for regression. Therefore we remove noise in the model and conducted a new analysis removing the variables that are not significant. Although we have found weak support
for perceived ease of use, facilitating conditions and perceived usefulness influencing current use and future use intention, TAM states that perceived usefulness is influenced by perceived ease of use [9]. A regression analysis of the factors affecting perceived usefulness shows that the model provides a good explanation on perceived usefulness.

![Figure 2. Revised explanation model, Notes: Standardised betas are reported ** p < .01    *** p < 0.001](image)

5. Discussion

The study has several limitations. First, our study was limited to 14 subjects which are few in order to do statistical analysis, so all results should be seen in light of this fact. Second, we used subjective measures only. The study relies on subjective reporting of use and not actual monitored use (such as logs).

The results show support for the perception that compatibility of the e-learning tools is positively associated with the e-learning tool usage. This is inline with theories information technology adoption [7]. Compatibility in this context implies that the subjects of our study found the e-learning tool to be compatible with the way they study and that it fits with the way the course is organised. Previous e-learning research similarly indicates that students prefer e-learning not to replace traditional instructor-led training, but rather be a complement to it [15].

There was significant support for the hypothesis that subjective norm of using the e-learning tool is positively associated with e-learning tool usage. Subjective norm have been found to be more important prior to, or in the early stages of innovation, as was the case with the subjects in our study [16]. The instructors of the courses were the primary motivators for using the e-learning tool; they published material on the tool, and had communication (questions and answers) with the students through the e-learning tool. Ndubisi [17] found that the course leader’s influence contributes significantly to the subjective norm.

The factors facilitating conditions and ease of use influence had a large effect on perceived usefulness. This is inline with earlier studies [6, 18]. We did not find that any of the independent variables provided significant explanations on the dependent variable future use intention although influencing current use. One possible explanation is that none of the subjects intended to take more courses – and consequently did not foresee to have the possibility to use e-learning again.

6. Concluding Remarks

We found support for the fact that the students considered the e-learning to be compatible with the course in question had a positive effect on e-learning tool usage. Furthermore, we found support for the hypothesis that subjective norm was important for tool usage. In the case of this study, the tools usage was not optional, and teachers
encourage the students to use the tool. We also found support for factors facilitating conditions and ease of use leads to the e-learning tool being considered useful.

We have done interviews with the subject that will shed more qualitative insight into what factors that influence adoption. Future studies should also consider the effect of accreditation of the e-learning course on acceptance it receives [19].

References


