# The Impacts of Informatics Competencies and User Training on Patient Information System Implementation

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Abstract. User training of information systems is crucial for the employees. However, it is not only the basic skills of information technology that determine what kind of training is required for the implementation. This study describes the users' professional competence and the implementation training, including information of the computer user training and learning methods. The target group consisted of the employees trained first to implement electronic health record systems in the Central Finland hospital district (n=290). Statistical methods such as frequency and percentage distributions, mean values and cluster averages were used in the analysis. The sum variables were made up by using factor analysis. Respondents were mainly satisfied with the classroom teaching. Almost half of them had practised the use of information systems after the teaching in the training environment. Good learning results were obtained when practising with personal guidance.

Keywords: Health services, information systems, computer user training (MeSH)

#### 1. Background

Health information system implementation comprises different phases. The different phases in the implementation process are, in general, user needs and requirements analysis (specification), system design, initial system implementation and testing [1, 2, 3]. The system requirements analysis includes workflow analysis; the initial system implementation includes the technical installation of the information system, the integration of the information system into other information systems and users' training.

End user needs and requirements are analysed when the system is defined and designed. After the system installation and testing, the users are trained and the implementation proceeds to integration into other systems and building up a technical and maintenance system. Often when implementing a totally new system, the testing is carried out through a pilot study. In a pilot project, some units implement and test the new system before it is distributed to the organisation as a whole. [4] From the end-user perspective, the critical issues concerning health information system implementation are project management, system design, organisational issues and training and support. [5]

Implementing an information system always changes work processes and routines, which is why it is important to endorse employees' attitudes. This can be done with information, training and also by involving employees in planning and in the implementation. [3, 4, 6] A health information system implementation process is a part of organisational development. [4] The employees' involvement is crucial for the

implementation at all stages [cf. 1]. The change in work can evoke negative feelings in some employees, and in order to prevent uneasy effects it is essential to clarify the reasons for the innovation and stress the expected benefits for the organisation as a whole [4, 7]. The emergence of negative views can be seen as a good sign: the change and implementation is taken seriously and being reacted to.[7, 8] Proper training and support are an essential part of an health information system implementation process [cf. 1, 4, 6, 10, 11, 12], and sufficient learning is essential for professional expertise. Training opportunities indicate that the organisation supports the implementation and development. [3, 4]

The implementation of a health information system requires extensive support and training in order to achieve user acceptance. The training plan must be completed before the initial implementation, and it should also include intensive support during the implementation. In the most successful implementation, the end-users have more support after the initial implementation than before it. [6]

There are also differences in computer literacy among healthcare professionals. [3, 14] Computer literacy means basic skills in the use of computers, e.g. reading and writing. Information literacy consists of computer literacy, information retrieval abilities and communication skills. [14] Therefore, the users' skills, as well as their needs, must be taken into account when planning the training of a new information system. The quality of user training has a key role in regard to a good user acceptance of an information system. [4, 13] In Finland, some employees in health care have not been educated at all in information technology during their occupational education. [14] In addition, work experience has been shown to correlate with general computer skills. Those who have less than 10 years of work experience estimated their computer skills better than those with long work experience [15]. The need for more training has also been noted in previous studies [16].

Health information system training has mainly been a part of an introduction course into a new function. Teaching methods have often been traditional, such as written material and lectures. More attention should be paid to setting up the goals for training and measuring the preferable competence level of learning. [13]

### 2. Objectives

This paper presents a study that took place in the Central hospital of the Central Finland Health Care district after a pilot project of a patient information system implementation. The purpose of the study was to describe the professional competence in information systems of the users in health care after the training sessions. The paper also includes a description of the implementation training that involves information of the computer user training and learning methods. The professionals' approach towards information systems and the training methods used were also explored.

#### 3. Data Collection and Analysis

The target group of the study consisted of the first employees to implement electronic health record systems in the Central Finland hospital district (n=290). The percentage of response was 48. The questionnaire consisted of background themes, questions about computing skills and previous computer training, training methods and user support. Open-ended questions about ideas for developing system learning were also asked. The questionnaire was completed in November 2006. Statistical methods such

as frequency and percentage distributions, mean values and cluster averages were used in the analysis. The sum variables were made up by using factor analysis.

#### 4. Results

Most respondents (n=138) considered their computer skills average, and every fourth (26%) thought that they had good skills. 11% of respondents reported poor skills. As for patient information system skills, users (n=138) considered that they had average skills (mean 8, SD 1,5) \* but figuring the standard deviation, some had learnt well and others less during training. Comparing computer skills with work tasks, 14% of respondents had excellent skills, 39% good skills and 32% satisfactory skills, while only one percent considered their skills poor.

Concerning computer skills, statistically significant differences were found between age groups ( $\chi^2$ =8.163, p=0.043). General computer skills decreased from 8.6 in the age group of 25–34 years to 7.2 in the age group of 55–65 years. The youngest employees considered their computer skills better than the older ones. When analysing patient information systems competence, there was no measurable statistical significance between the different age groups.

There was no correlation between work experience and general computer skills (p=0.861). Nor did work experience correlate with patient information system competence (p=0.442). Instead, work experience correlated with computer skills ( $\chi^2$ =9.4, p=0.024). The employees with work experience between 6 and 15 years felt more confident with their computer skills than the groups with less or more experience in work (Fig 1)



#### **Basic Computer Skills and Informatics Competency**

Figure 1. Working experience and computer skills dependency

Respondents (37%) recognised that they require more training in computing even after the basic education. More than half of respondents (59%) were familiar with the internet and email, and 58% of respondents were also comfortable with using hospital information systems such as a patient administration system, laboratory system and radiology system (PACS).

Patient information system training methods and ways were also analysed. Less than half of respondents (41%) had earlier learnt best through classroom teaching, and by

44% this was considered the best way to learn. Classroom teaching was found the most convenient teaching method by 73% of respondents. Practising with personal guidance was a favourable learning method for 45% of respondents. Practising and studying independently in one's own work unit was considered the best way to learn by 24% of respondents. Written material or online material learning was considered a good way to learn by 29% of respondents.

Attitudes towards the implementation of the patient information system were positive among half of respondents (52%), while 34 % of respondents had negative attitudes towards the implementation of the patient information system. After the user training, almost half of respondents (48%) changed their negative attitude to positive.

#### **Patient Information System Training**

Three sum variables describing the patient information system training were named: I the content of patient information system training and teaching methods (13 items), II classroom teaching (4 items) and III the development of training (5 items). The content of patient information system described the teaching methods used, the content of training and basic computer training during working hours. Classroom teaching described e.g. the atmosphere of a training session and the instructor's knowledge. The development of training and further training. The respondents were satisfied with the content of the patient information system training as well as the teaching methods used (mean 4) and classroom teaching (mean 4). A need to develop training was found (mean 2.9).

No statistically significant differences concerning the content of training and teaching methods were found between the different age groups (p=0.925). Nor was there a statistically significant difference between the age groups concerning opinions about classroom teaching (p=0.321), or between the groups with different lengths of work experience concerning views about classroom teaching (p=0.198). A statistically significant difference was found between the age groups in regard to the development of training (p=0.005). Older employees desired more modifications to the training sessions. Concerning the improvement of training, no statistically significant difference was found between the groups with different lengths of work experience (p=0.167). After the implementation training, some educated people thought that they would benefit from more training in the use of computer and information systems.

#### 5. Discussion

The aim of this paper was to describe the users' professional competence and the implementation training, concerning patient information system user training and learning methods. The results reveal that computer skills in relation to work tasks were estimated better in the group with work experience between 6 and 15 years. Those who had less or more work experience assessed their skills lower. Presumably, employees who have over 15 years of work experience have no formal education in computing. [cf. 14] The question about computer skills in relation to work tasks was considered a troubling question since 14% did not answer it. Work experience and general computer skills did not correlate in this study the way they did in a previous study [15], in which employees with less than 10 years of work experience. More than half of respondents knew they

can master basic computing, but 37% recognised the need for more training. Similar results were obtained in previous studies [16].

As noted in section 4, offering employees training using different teaching methods, such as classroom teaching, information events, a learning environment for educational purposes and written material, has been useful. According to the respondents, it is necessary to arrange classroom teaching concerning patient information system implementation. The results also indicated that classroom teaching and training independently in one's own work unit sustain the learning of a new patient information system. The content of training, including sufficient basic computer training, corresponds with the information needed in daily practice. The respondents felt that they obtained basic skills for utilising the patient information system in daily practice. Although respondents felt that the arrangements of patient information system training and the instructors were good, the results reveal the need for more training in the use of the information system, as well as personal counselling.

The study propounds that, besides formal classroom teaching, information system training should be combined with practising with personal guidance and studying independently in one's own work unit. This reveals that in addition to the traditional behaviouristic view on learning, a cognitive approach and constructivism are needed. [cf. 13] They involve individualism and personal activity and motivation. Training sessions are arranged when a system implementation is being carried out, but furthermore, there is a constant need for maintenance training and development.

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