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E-inclusion Process and Societal Digital Skill Development

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Abstract

Nowadays, the focus shifts from information and communication technology access to skills and knowledge. Moreover, lack of digital skills is an obstacle in the process of learning new digital competences using technologies and e-learning. The objective of this research is to investigate how to facilitate students to use the acquired digital skills in practice and to evaluate the impact of students' previous knowledge level. Based on the e-inclusion digital skills model, the author develops two research questions: *How students' previous experience impacts practical usage of the acquired ICT skills* and *How students' self-assessment correlates with practical usage of the acquired ICT skills*. The research employs student-centred learning theory, where the learning process is based on students' active action, experience and values. The research is based on a literature review and one case study. The results of this study confirm the relationship of the e-inclusion digital skills model with the knowledge level acquired and its usage.

Keywords: e-inclusion, e-learning, digital skills, student centered learning, education for sustainable development

Introduction

E-inclusion is a priority issue for the European Union (EU) in developing the i2010 policy (European Commission, 2005). E-inclusion policy aims at reducing gaps in information and communication technology (ICT) usage and promotes the use of ICT to overcome e-exclusion. Its long-range goal is to improve economic performance, employment opportunities and generally enhancement of the quality of life for the e-marginalised (FreshMinds, 2007, 2008).

The Riga Ministerial Declaration on e-Inclusion (Ministerial Declaration, 2006) states that e-inclusion means both inclusive ICT and the use of ICT to achieve wider inclusion objectives. Generally, any e-inclusion process means a series of actions for promoting e-inclusion of society. There are three main stages for providing e-inclusion of society by ICT (Figure 1).

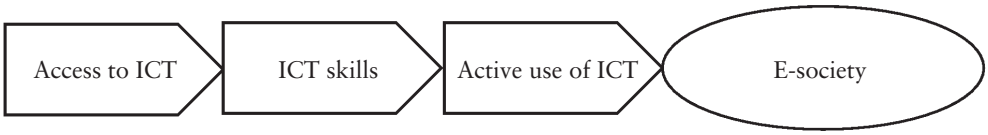

Figure 1. E-inclusion Process

The term "digital divide" came into usage in the mid-1990s. Initially, the digital divide included the imbalance of physical access to technology (Rapaport, 2009). The first stage or an early digital divide focused on providing access to ICT (Selwyn, 2004). For instance, each individual has a personal computer, the Internet connection, a phone for different services, such as e-government, newspaper reading, job seeking, e-learning, etc. These services are available for anybody now. There is no difference in age, sex, geographical location or economical status. Also people with disabilities have access to ICT.

Nowadays, the digital divide goes beyond the issue of access to technology. The focus shifts from access to ICT to digital skills (Hargittai, 2002; McLean, 2006; Zhao & Elesh, 2007). In the report of Organisation for Economic Co-operation and Development (2010), it is stated that the second digital divide separates those with the competences and skills who benefit from computer use from those without.

The second step of e-inclusion process relates to acquiring digital skills. There are more and more places where the Internet and computers are available. People, however, often lack the necessary skills to use the available services. Deursen and Dijk (2009) support this observation; they have evaluated citizens' skills to use e-services and have concluded that not all citizens with access to the Internet have the skills to use e-services. Lack of digital skills is an obstacle in the learning process of new digital competences using technologies. Improvement of digital skills and competences is recognised as a factor which facilitates the reaching of e-inclusion goals in EU official papers, such as the E-inclusion Declaration (Ministerial Declaration, 2006). Moreover, several research papers identify digital skills and competences as the key issue for reaching e-inclusion goals (Vitolina, 2009).

For instance, recommendations regarding e-inclusion and improving digital skills as the main priority are presented in a study by the European Computer Driving Licence Foundation, contributed by experts from more than 30 countries (ECDL, 2007). Improvement of digital skills and competences as an important facilitator of e-inclusion is promoted in Latvia e-inclusion report (Latvia e-inclusion report, 2008) and is also featured in recommendations by the Digital Literacy High Level Expert Group (DLHLEG, 2008).

Digital skills are basic to digital competences. These competences, according to the declaration, mean equipping citizens with the knowledge, skills and lifelong learning approaches to increase social inclusion, employability and richness of their lives. The EU approach is to facilitate lifelong learning by using digital technologies or e-learning to support reaching of the e-inclusion aims. One of the key components of the long-term agenda for the 21st century is lifelong acquisition of digital skills (Commission of the European Communities, 2007).

Access to ICT does not mean e-inclusion. Digital skills promote but do not guarantee e-inclusion. Individuals who use their digital skills are fewer than individuals who have appropriate skills. The active use of ICT is necessary for participation in e-society.

The objective of this research is to evaluate the impact of students' previous experience (knowledge level) and to investigate how to facilitate students to use the newly acquired digital skills in practice.

Theoretical Background and E-inclusion Digital Skills Model

Generally, skills are acquired by learning and this includes digital skills. However, it is important to provide such training where learned skills are used practically; especially if individuals benefit from newly acquired skills. The paper describes an *E-inclusion Digital Skills Model* based on learning theories, where the result of learning depends on students' values and previous experience.

The model is based on the learning theory of Vedins (2011). According to Vedins, learning is a feature of a self-driving system. Moreover, learning is realised as an action of a self-driving system. To reach the result, different actions are necessary, but, in the e-inclusion digital skills model action means the acquisition of new theoretical knowledge and practical digital skills. The model describes how students use theoretical materials and complete practical tasks in the process of learning new digital skills.

According to Dewey (1938), the purpose of learning is not acquisition of a predetermined set of skills, but rather realisation of students' full potential and the ability to use those skills for their needs. Therefore the model supports a learning approach based on an inquiry method. Learning is a process where the students make inquiries, study, consider, and reflect based on their evidences (Ferrance, 2001). In the case of ICT learning, appropriate learning resources should be provided. There should be a possibility to choose suitable materials, to watch or read this material several times, depending on students' experience and needs. Dewey (1938) argues that learning must be active. The teacher should not give instructions but rather create learning situations. The main role of the teacher is to consult and assist students (Barr & Tagg, 1995).

Students' previous experience plays an important role in the model. In the constructivist theory, each student constructs new knowledge from his/her experiences (Chan & Torres, 2010; Honebein, 1996). Students relate the newly acquired information to their prior experiences. Hence, knowledge is not simply broadcasted. Acquisition of knowledge is individual for each student and depends on students' previous experience.

Vedins (2011) argues that students' activity regarding the learning topic is based on their previous experience and knowledge level. The value of the topic for the student is minimal if the student does not have any appropriate previous knowledge. Then learning of the topic is meaningless to the student. Another case is a situation when the student has excellent knowledge of the topic. Then learning is too boring for the student. The way to acquire new knowledge is related to the level of current knowledge. During the learning process of any ICT topic, preliminary digital skills are important.

According to Dewey (1913), learning results depend on students' interests: social, individual and related to their intellect and desire to make findings.

An important part of the model can be found in results followed by action–learning (Vedins, 2011). The results can be positive or negative. The author assumes that the result is positive in the case of usage of the acquired skills in practice. The result is negative if the acquired skills are not used in practice. According to Vedins, a reflexive relation between the action and the result is a very essential function in the e-inclusion

digital skills model. Self-regulation of the learning system with the reflexive connection happens in two ways. Positive results provide an extra stimulus for students. For instance, students enrich their experience and find additional possibilities to learn new skills. In the case of negative results, the system provides self-adjustment. In such a situation, students repeatedly improve their skills about the corresponding topic.

Based on the e-inclusion digital skills model, the author develops two research points:

How students' previous experience impacts practical usage of the acquired ICT skills and *How students' self-assessment correlates with practical usage of the acquired ICT skills*.

Case Study

The research participants were a group of teachers from different vocational schools in Latvia. 12 teachers took part in the e-learning course "Improvement of ICT Skills" in Moodle. The course was designed by ITC experts and lasted from July, 2010 to March, 2011. Based on group inquiry tasks, there were 15 topics included in the course for digital skills improvement: set-up of peripheral equipment; scanner; search engines, image processing; e-maps; e-mail; basic of web pages creation and publishing; objects in web pages; PDF file format; safety working with the computer; basic of DBMS MS Access; video processing; e-learning courses; MS Excel; social networks. Each topic included theoretical material in video and text format; practical exercises; tests for knowledge assessment.

There were 32 questionnaires for evaluation of the knowledge level and previous experience of the teachers. Test results were also used in the research. The group completed questionnaires before and after the course and before and after each topic. After each topic, the group completed a test.

The questionnaire before each topic helped to evaluate the previous experience or knowledge level of the group related to the topic. If the knowledge level was low, the score was one. The score was five if knowledge assessment was high. In the same scale, the group evaluated their knowledge level after learning each topic. After the learning each topic, the group predicted the practical usage of the acquired skills.

The score was 1 if the teacher did not plan to use the acquired skills in practice. The score was 5 if the teacher certainly planned to use the acquired skills in practice. Four weeks and eight weeks after completing the course, each teacher was questioned to determine practical usage of the acquired skills.

Results

Prediction, Practical Usage and Knowledge Level

Figure 2 presents teacher's self-prediction about their practical usage of the acquired skills. Teachers made predictions before learning the topic. The score of self-prediction is 1 if the teacher did not plan to use the obtained skill in practice. The score is 5 if the teacher planned to use the acquired skills certainly. The average score for all topics is 4.4.

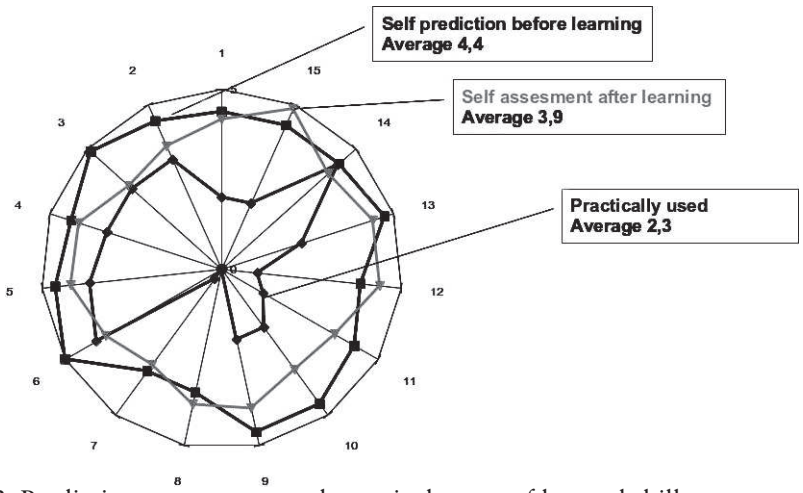

Figure 2. Prediction, assessment and practical usage of learned skill

The second line presents the average score of test results after the learning each topic (Figure 2). Depending on the knowledge level, the test score range from 1 to 5. The average score of all topics is 3.9.

The third line in Figure 2 describes practical usage of the acquired skills. The score is 5 if the teacher used the acquired skills in practice. The score is 1 if the teacher did not use the acquired skills. The average score is 2.3.

The correlation between the practical usage of the learned skills and the test score is low: 0.07. But the correlation between the practical usage of the learned skills and the prediction is high: 0.8. The correlations present that practical usage of ICT is not related with test score, but rather with student's wish to use newly learned skills.

Knowledge Assessment

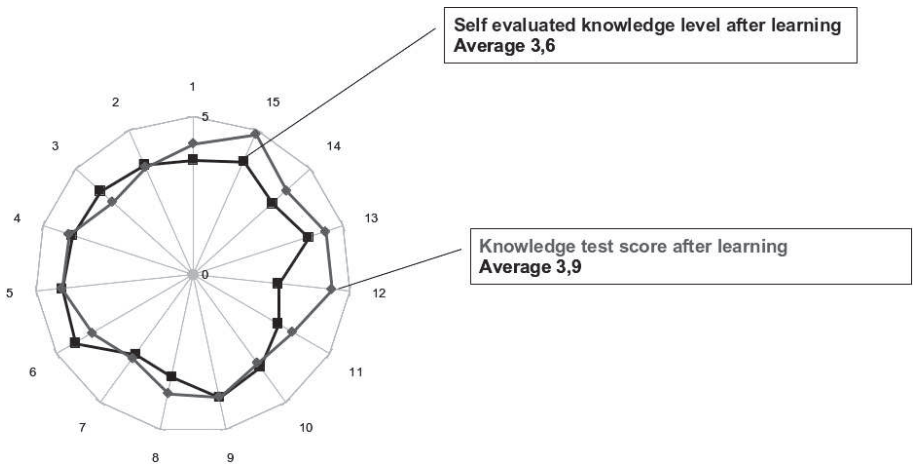

Figure 3. Knowledge level of teachers after learning: self assessment and test score

Figure 3 presents the knowledge level of teachers after learning. The knowledge level is measured from 1 to 5. 1 means that the teacher did not have any knowledge of the topic. 5 means that the teacher's knowledge level was excellent. The teachers' knowledge level was evaluated by self-assessment and by test. The average score of self-evaluation is 3.6. The average score of test results is 3.9. The knowledge level measured by the test is higher than the self-assessment of knowledge. The difference is 0.3. The correlation coefficient between the test score and self-evaluation is 0.5.

Knowledge Level (Experience) and Usage in Practice

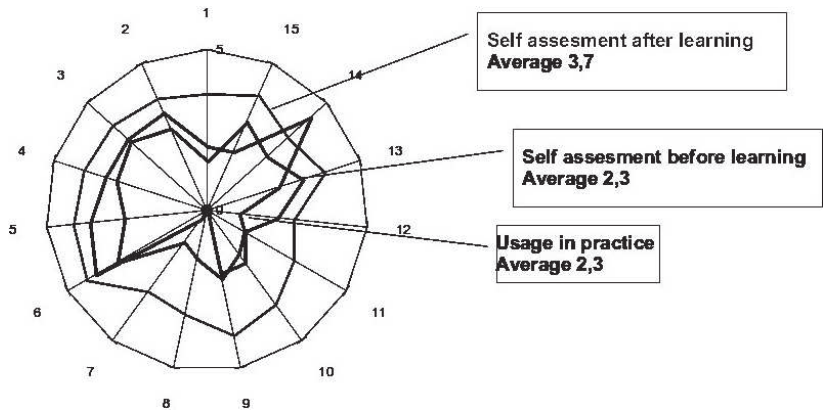

Figure 4. Comparison of teachers' knowledge level (experience) and usage in practice

Figure 4 presents the average score of self-assessment before the learning of each topic, that is 2.3. The average for knowledge self-assessment after learning is 3.7. The growth is 1.4. The average score of practical usage of the learned skills is also 2.3. The correlation coefficient between practical usage and knowledge self-assessment before and after learning is 0.7.

Knowledge Level Before Learning and Usage in Practice

To investigate the differences in experience, the teachers were divided into groups for each topic. The first group included teachers who practically used the acquired skills. The second group consisted of teachers who did not use the acquired skills practically. Figure 5 demonstrates that the average for knowledge level before learning is 2.8 in the case of the practical usage of knowledge.

If teachers did not practically use the acquired skills, the average score of knowledge level before learning was 1.8. The knowledge level is measured from 1 to 5, where 1 – a teacher has no knowledge, 5 – a teacher has excellent knowledge.

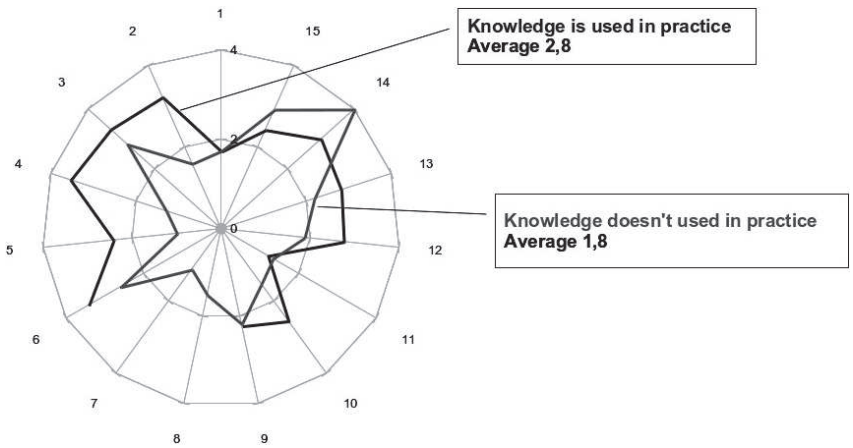

Figure 5. Knowledge level before learning and usage in practice

If the teachers' previous experience was low (the score of knowledge level is less than 1.5), then only 28% of the teachers use the acquired skills in practice (Figure 6). If the previous experience is from 1.6 to 2.5, then 50% of the teachers use the acquired skills in practice.

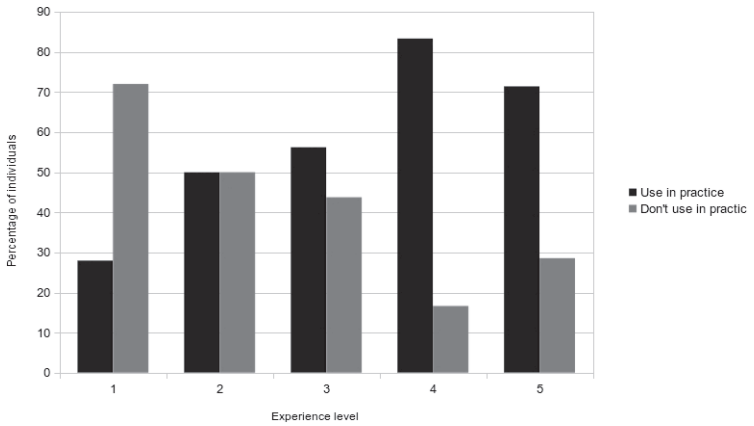

Figure 6. Experience level and usage of the acquired skills in practice

Conclusions

The results of the study indicate that there is no correlation between test scores and practical usage of the acquired skills. It means that a high test score does not guarantee practical usage of the acquired skills or participation in any e-society. However, there is a correlation between self-prediction and practical usage of the acquired ICT skills. Moreover, the results draw attention to the relationship between knowledge self-assessment and practical usage of the acquired skills. Higher knowledge self-assessment promotes practical usage of the acquired skills. These results correspond to the e-inclusion digital skills model where the result of activity depends on previous experience and interests.

The acquired skills are used practically if the knowledge level before the learning of a new topic is above the average level. So, a prior training is necessary while individuals reach an adequate knowledge level. This result confirms the e-inclusion digital skills model where the relationship between usage and knowledge levels is set up. However, a further study is necessary to determine why the acquired skills lack practical usage or participation in an e-society. The author assumes that more information on methodology, models and samples of the e-learning process of digital inclusion is necessary to be provided for teachers in Latvia.

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