Career paths training for the first year students in information systems science

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Career Paths Training for the First Year Students in Information Systems Science

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ABSTRACT
A gap between real life and theory usually exists in education. However, this gap can be crossed in all levels of an ICT curriculum. The constructivist learning theory and the concept of professional growth can be the building blocks for a career path course in which students can meet their professional needs since the beginning of studies. At the University of Jyväskylä we ran the career path of ICT course for new information systems students during the first month of their studies. The course included expert lectures of ICT professionals representing the different aspects of ICT work. Additionally, the students were expected to discuss these issues in their assignment.

In this paper we clarify why and how we ran our career path course. In addition, we present how different ICT core skills were developed during the course. The knowledge of the core professional areas in our information systems curriculum developed positively. Especially, professional images concerning a system analyst’s and a project manager’s profession improved well.

Keywords
Information systems education, professional identity, career paths.

INTRODUCTION
Robertson (2011) claims that especially in business studies there is a gap between real life and theory. To cross this gap it is essential to connect students to real world problems since the start of studies. Schunk (2004) also argues that a learning strategy through experimental approach from experienced experts is more effective as it makes the learner an investigator who systematically varies conditions (independent variables) and observes changes in outcomes (dependent variables). This also helps to minimize real life and theoretical gap.

In the faculty of IT at the University of Jyväskylä this fact has been recognized since the 70s when a project work course was launched first time. Pirhonen (2009, 2010) have shown that students find their skills in communication, team work, and personal development significantly improved during the course. According to study of Tynjälä, Pirhonen, Vartiainen and Helle (2009) variety of skills and know-how needed in a work of a project manager in the field of information systems were learned. In addition, the students’ communication with real customers has been a valuable part of in JyU’s ICT curriculum improving professional identity and qualification (Isomöttönen & Kärkkäinen, 2009).

However, to be qualified for the project work course a lot of basic ICT developer skills must be learnt before the course. The students should be motivated to learn complicated technical issues at the beginning of studies. Secondly, students need practical training and real connections to the ICT practice for understanding complicated ICT jargon at the beginning of studies. Based on this need at the University of Jyväskylä we decided to launch a new course called the career paths of ICT. The core point in this course was expert lectures by real professionals. First time we ran this course at the beginning of the academic year 2011-2012.

In this paper we introduce the theoretical background for our teaching case. This is followed by the course description. In the empirical part we clarify how the different aspects of professional identity were developed. Our basis was the professional roles, which are needed in systems development. At the end we summarize the potential of our approach to tie new students into studying information systems by using career path training. We also discuss potential research topics followed by this paper.
THEORETICAL BACKGROUND

Many learning theories emphasize the meaning of real life experiences in learning processes. One leading theory in the current era is the constructivism.

Jonassen (1994) summarizes what he refers to as "the implications of constructivism for instructional design". The following principles illustrate how knowledge construction can be facilitated by:

- providing multiple representations of reality,
- representing the natural complexity of the real world,
- focusing on knowledge construction, not reproduction,
- presenting authentic tasks (contextualizing rather than abstracting instruction),
- providing real-world, case-based learning environments, rather than pre-determined instructional sequences,
- fostering reflective practice,
- enabling context- and content dependent knowledge construction, and
- supporting collaborative construction of knowledge through social negotiation.

In addition, constructivism also allows that the accent is on a learner rather than a teacher. It is a learner who interacts with his or her environment and thus gains an understanding of the subject matter. Under constructivism, learners have freedom to make their own conceptualizations and find their own solutions to problems, mastering autonomy and independence. In this context, the curriculum for constructivism should be organized in a spiral manner allows students to build upon what they have already learned. Bruner’s theory (1973) explains that an instruction with the experiences that make the student willing and able to learn (readiness). This kind of instruction is structured so that it can be easily understood by a student (spiral organization). It is designed to facilitate extrapolation (going beyond the information given) which is more effective and productive in delivering and transferring key knowledge and skills.

By organizing a career path course we can reach many of these goals. This can include lectures delivered by real ICT professionals representing different aspects of ICT area. In addition to lectures, students should have a reflective part including the discussion of lectures and searching for more information on ICT professions.

In addition, the need for a career path course can be justified from the perspective of sociology. Moreover, learning is contextual: we do not learn isolated facts and theories: we learn in relationship to what else we know, what we believe, our prejudices and our fears. Learning is active and social and hence we cannot divorce our learning from our lives (Hein, 1991). The concept of professional qualification emphasizes the meaning of professional growth. And the professional growth is closely connected to the motivation (Ruohotie, 2000, p. 75). In this process Ruohotie (1999, p. 69) also emphasizes the meaning of every-day situations and interaction between a learner and her/his environment. This means that a career path course can be a useful tool to motivate and encourage students to learn information systems science.

OUR CASE

At the University of Jyväskylä we have the longest tradition of project-based learning in Finland. We launched the project work course in the year 1977. The basic idea was that after two years theoretical studying the students are able to participate in information systems development projects in different roles.

In the year 2011 the steering committee of the information systems science department decided that new students should be motivated to learn theoretical content in a new way. Thus, we launched the career paths of ICT course in the fall of the year 2011.

The course included three basic elements

- expert lectures by the former students of the ICT faculty,
- lecture diaries written by all the students, and
- presentations created by students based on their own studying.

The lecture program was based on the information systems curriculum at the University of Jyväskylä. Therefore, expert lectures represented different phases, aspects and roles on information systems lifecycle. The experts provided 10 lectures. The topics of the lectures are presented in table 1.
Lecture 1 | The roles of ICT development in a software development company (Tieto Plc. -tieto.com)
Lecture 2 | The work of the test manager in the development project at the Finnish parliament
Lecture 3 | ICT service management at the Finnish parliament
Lecture 4 | Data security and risk management in the metal industry (Metso Plc. -metso.com)
Lecture 5 | Working as researcher of digital media and electronic commerce at the University of Jyväskylä
Lecture 6 | Working as a consultant, a project manager, and a development manager at digital services industry (Digia Plc. –digia.com)
Lecture 7 | Developing information systems for course management and management reporting purposes at the University of Jyväskylä
Lecture 8 | ICT in a mobile operator business and at multinational TeliaSonera (TeliaSonera Finland Plc. –teliasonera.fi)
Lecture 9 | Developing e-learning infrastructure and solutions at the University of Jyväskylä
Lecture 10 | Developing ICT infrastructure and architecture and software portfolio in public health care (Central Finland Health Care District - http://www.ksshp.fi)

Table 1: Lecture topics.

The meaning of these lectures was that the students would be aware of the skills and technologies needed in an ICT profession during an information system lifecycle. In addition, our goal was that the development of professional identity should be started at the beginning of the studies. Our claim was that the students would be motivated to learn both work management issues and advanced technologies included in our curriculum.

To provide an active learning experience every course participant was expected to write findings after each lecture. In this way the students created lecture diaries and these were returned after all the lectures. The students needed to participate in 6 lectures as minimum. From each lecture students needed to report what they have learned, what was emphasized by a lecturer, and why a lecturer rates his profession significant in the field of ICT.

In academic work and studying one of the main points is providing own contribution. To fulfill this requirement we ran an assignment including students’ own studying concerning ICT professions. The students needed to search for the information on the web to find information on four typical ICT professions. The students worked in the small groups of two to five students or they completed this part individually. The outcome of this exercise was presented either as a live traditional presentation in our seminar or as a video presentation on our wiki site. In both cases the students were expected to comment on each others’ presentations. 19 students completed this part in the traditional way and 91 participated in the video presentation seminar on the web.

**EMPIRICAL PART**

The data for this study was collected by administering a questionnaire both at the beginning and end of the course. The respondents rated each profession of the course with regard to their knowledge level concerning each profession (where 1=very poor knowledge and 5=very good knowledge). In this way we found how different aspects of professional identity were developed during the course.

The professions were

- a programmer,
- a system analyst,
- a project manager,
- a system maintainer,
- a database designer,
- a data communications professional,
- a web and multimedia designer, and
- other ICT job.
The details of the analysis concerning the knowledge development of the students are shown in Table 2. Since the data based on the responses of the students concerning the goals of the course did not agree with the normal distribution, the related-samples Wilcoxon signed rank test was appropriate for the analysis of the data. We compared the mean of the respondents at the beginning of the course to the mean at the end of the course. In our results the notable facts were that all the knowledge of all the areas was developed highly significantly and knowledge concerning the system analyst’s and the project manager’s profession were developed especially well.

<table>
<thead>
<tr>
<th>Level of knowledge (mean)</th>
<th>Beginning</th>
<th>End</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Programmer</td>
<td>2.37</td>
<td>3.40</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>System analyst</td>
<td>1.80</td>
<td>3.28</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>Project manager</td>
<td>1.94</td>
<td>3.14</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>System maintainer</td>
<td>2.21</td>
<td>3.19</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>Database designer</td>
<td>1.67</td>
<td>3.26</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>Data communications</td>
<td>1.79</td>
<td>2.65</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>professional</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Web and multimedia</td>
<td>2.48</td>
<td>3.28</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>designer</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other ICT job</td>
<td>2.01</td>
<td>3.07</td>
<td>&lt;.0001</td>
</tr>
</tbody>
</table>

Table 2. Analyzing the students’ knowledge of concerning different professions.

SUMMARY

In this paper we analyzed the effect of our career path training on the professional identity. Based on our data we found this kind of training useful at the beginning of the ICT studies and it is especially beneficial in the system analyst’s and the project manager’s identity, which are the core issues in our IS degree program. We can recommend our approach to all the areas including technical details and clarified professional identity.

However, further analysis must be performed. One meaning of the career path training is improving students’ motivation to learn complicated technical issues. We have collected data concerning the motivation to learn in our pre- and post-questionnaires and these results will be presented in our next analysis. The motivation factor is critical, because the funding of Finnish universities primarily will be based on the number of achieved degrees (Ministry of Education and Culture of Finland, 2011). In addition, this kind of training requires the evaluation of longer-term effects of training. When the students of this study have received bachelor or master degrees new questionnaire results can show the permanent effect of our training. The results can be supported by interviewing selected students.

One significant issue in our study is analyzing how different genders benefited from our training. In discussion on ICT education the small number of female students has been recognized as a problem. For example in the 2000s under the Update consortium (Update, 2008) has been conducted research concerning motivating young females to study technology. Based on these studies both pedagogical and motivational solutions have been suggested for improving females’ interest to study ICT (Chatoney & Andreucci, 2009)(Dakers et al., 2009). However, these studies are focused on students before university studies and still in the year 2010 for example at the University of Jyväskylä 1329 males and only 365 females studied for undergraduate ICT degrees (Kokko, 2011).

It is also significant to clarify what kind of coursework is more suitable for this course. In the coursework based on the students’ own studying the students had two options- (1) a web-based assignment or (2) a traditional seminar work. In the first option the students created they own presentation using a screen capture video recorder. This was followed by publishing a video on YouTube and creating a link to the address on YouTube from the course wiki of the course. On the course wiki the video clips were as floating objects in the widget format. The students were expected to comment on each
others’ outcomes. In the second option the students created the seminar slides for normal seminar sessions and presented the content of the slides there. They were also expected to comment on each others’ presentations.

REFERENCES