CAREER PATHS TRAINING – A WAY TO IMPROVE MOTIVATION SINCE THE BEGINNING

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ABSTRACT

A gap between real life and theory usually exists in higher 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 at 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 students’ motivation was developed during the course. According to our results, the students were more motivated to study to become a programmer, a system analyst, a project manager, and a system maintainer than to a job of a database designer, a data communications professional, and a web and multimedia designer. The result gives the guidelines to the next evaluation round of the information systems science curriculum at the University of Jyväskylä and other academic entities.

Keywords: Information systems education, professionalism, expertise, motivation, career paths.

INTRODUCTION

Robertson (2011) claims that especially in business studies there is a gap between real life and theory. In order to bridge this gap it is essential to connect students to real world problems since the beginning of the 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).

In the faculty of IT at the University of Jyväskylä this has been recognized since the 70s when a project work course was launched for the first time. Pirhonen (2009, 2010) has shown that students find their skills in communication, team work, and personal development significantly improved during this course. According to a study by Tynjälä, Pirhonen, Vartiainen and Helle
(2009), a 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 to understand the complicated ICT jargon. Based on this need, it was decided at the University of Jyväskylä to launch a new course called The Career Paths of ICT. The main point in this course was to provide expert lectures by professionals from working life. First time the course was run at the beginning of the academic year 2011-2012.

In this paper we look at the development of the ICT students’ study motivation in relation to this course. We describe the meaning of engagement and motivation in learning, which is the core point in analyzing the success of our approach. This is followed by the course description. The empirical part includes an evaluation of how the students’ motivation concerning the ICT jobs was developed.

**THEORETICAL BACKGROUND- STUDENT CENTERED LEARNING AND MOTIVATION**

Many learning theories emphasize the meaning of real life experiences in learning processes. One leading theory in the current era is based on 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 constructivism the accent is on a learner rather than a teacher. Accordingly in this learner-centered teaching or student-centered learning approach, knowledge is constructed by students and the lecturer is a facilitator of learning rather than a presenter of information (Rogers 1983a, 1983b; Prosser & Trigwell 2002). It is the 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.

By organizing a career path course we can reach many of these goals. The course consisted of lectures given by real ICT professionals representing different fields of ICT. In addition, students reflected upon the lectures and searched for further information on ICT professions. One aim of the course is to enhance students’ growth towards professional expertise, which, according to Tynjälä’s integrative pedagogy model (2008), is built of four main elements: theoretical or conceptual knowledge (substance knowledge), experiential knowledge (skills), self-regulative knowledge (metacognitive, reflection), and socio-cultural knowledge. Thereafter, the aim is to create connections between theoretical, experiential and self-regulative knowledge through reflection, which can be implemented through a variety of different ways. In the context of this course the students wrote reflective learning diaries.

As presented also in the integrative pedagogy model, learning is always 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, which 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. Most commonly motivation is understood both internally and externally (Biggs, 1984; Biggs, 1985; Entwistle & Ramsden, 1983; Linnakylä, 1988). Internal motivation (or intrinsic motivation) reflects a student's own interest in regard to espousing new knowledge. It is associated with a human's high-level needs such as self-actualization. External motivation (or extrinsic motivation) reflects the need to reach goals set by others. This is connected to a human's low-level needs such as security and survival.

Motivation in learning from text can be evaluated as shown in figure 1 (see next page) (Linnakylä, 1988). Pre-motivation is the sum of pre-interest and pre-benefit. Post-motivation is the sum of post-interest and post-benefit. Internal motivation is the sum of pre-interest and post-interest. External motivation is the sum of pre-benefit and post-benefit.
At the University of Jyväskylä we have the longest tradition of project-based learning in Finland. The project work course was launched in the year of 1977. The basic idea was that after two years theoretical studying the students are able to participate in real life information systems development projects in different project worker 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 at the early phase of their study path. Thus, we launched The Career Paths of ICT course in the fall of the year 2011.

The course included three basic elements:
• expert lectures given by former students of the ICT faculty,
• lecture diaries written by the students, and
• presentations created by students based on their personal work.

The lecture program was based on the information systems science curriculum. 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 (see next page).
Table 1. Lecture topics.

The meaning of these lectures was to increase students’ awareness of the skills and technologies needed in an ICT profession during an information system lifecycle. In addition, our goal was to support students’ development of their professional identity since the beginning of the studies. Our claim was that the students would thus be better 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 a personal lecture diary, which were returned to the teacher after each lecture. 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 to both types of groups. The respondents rated each theme of the course with regard to (a) how interesting they considered the themes of the course (where 1=very uninteresting and 5=interesting), and (b) how beneficial they considered the themes of the course (where 1=very useless and 5=very useful). In this way we found how motivational 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 and table 3 (see next page). Since the data based on the responses of the students concerning the motivation to learn the course topics agreed with the normal distribution, the related-samples Paired Samples T 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 previous results (Makkonen & Vaidya, 2012) the significant 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. We studied how the knowledge of the different areas was developed. In the current results the first noteworthy fact is that in all the cases internal motivation to learn the ICT areas remained the same. Concerning external motivation the students were more motivated to study to a programmer’s, a system analyst’s, a project manager’s, and a system maintainer than to a job of a database designer, a data communications professional, and a web and multimedia designer. In the areas of a programmer, a system analyst, a project manager, and a system maintainer statistically significant difference were not found between the start of the course and the end of the course. The result gives the guidelines to the next evaluation round of the information systems science curriculum at the University of Jyväskylä.
### Table 2. Analyzing the students concerning internal motivation.

<table>
<thead>
<tr>
<th>Role</th>
<th>Level of internal motivation (mean)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Beginning</td>
</tr>
<tr>
<td>Programmer</td>
<td>2.88</td>
</tr>
<tr>
<td>System analyst</td>
<td>3.57</td>
</tr>
<tr>
<td>Project manager</td>
<td>3.83</td>
</tr>
<tr>
<td>System maintainer</td>
<td>2.97</td>
</tr>
<tr>
<td>Database designer</td>
<td>2.97</td>
</tr>
<tr>
<td>Data communications professional</td>
<td>3.20</td>
</tr>
<tr>
<td>Web and multimedia designer</td>
<td>3.59</td>
</tr>
<tr>
<td>Other ICT job</td>
<td>3.64</td>
</tr>
</tbody>
</table>

### Table 3. Analyzing the students concerning external motivation.

<table>
<thead>
<tr>
<th>Role</th>
<th>Level of external motivation (mean)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Beginning</td>
</tr>
<tr>
<td>Programmer</td>
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<tr>
<td>System analyst</td>
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<tr>
<td>Project manager</td>
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<tr>
<td>System maintainer</td>
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</tr>
<tr>
<td>Database designer</td>
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<td>Data communications professional</td>
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<tr>
<td>Web and multimedia designer</td>
<td>3.88</td>
</tr>
<tr>
<td>Other ICT job</td>
<td>3.77</td>
</tr>
</tbody>
</table>
SUMMARY

In this paper we analyzed the effect of our career path training on the motivation to learn different areas of information systems science. Based on our previous result (Makkonen & Vaidya, 2012) 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. The knowledge of the all professional areas developed significantly during the career path training. In the current results the first noteworthy fact is that in all the cases internal motivation to learn the ICT areas remained the same. Concerning external motivation the students were more motivated to study to a programmer’s, a system analyst’s, a project manager’s, and a system maintainer than to a job of a database designer, a data communications professional, and a web and multimedia designer. In the areas of a programmer, a system analyst, a project manager, and a system maintainer statistically significant difference were not found between the start of the course and the end of the course. The result gives the guidelines to the next evaluation round of the information systems science curriculum at the University of Jyväskylä. However, the curriculum issues are based on many facts. These are labor market needs, the trend and visions of ICT, macroeconomics, and global economy and the division of labor between the entities (companies, countries etc.). And based on these inputs the faculty members should develop the curriculum and our results give the areas (database design, data communications, web and multimedia design) which should be under special development efforts if needed.

However, 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 considerable 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.

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