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Educating Reflective Practitioners: The Design of an IT Management Masters Program

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ABSTRACT

The IT Management Group at Umeå University, Sweden, has developed a master program in IT management with emphasis on incorporating practice in the learning process. The basic premise lies in the use of reflection-in-action as an approach to presenting students with practical problems throughout the program. We discuss the ways in which practice is at the heart of the program, both as a tool for exemplifying codified knowledge such as technical skills and methods but also as arenas for situated knowledge creation and transfer where reflection and action are intertwined. The paper ends with a discussion of the program design, challenges in implementing the reflective practice approach and competencies the students need in their future professional roles.

Keywords

IS Curriculum, Education, Reflective Practitioner, Reflection-in-Action, Academic and Industry Collaboration

1. INTRODUCTION

It is ironic that in the day and age of knowledge-intensive organizations, universities seem to be stuck with an industry-like organizational ideal where students are considered targets for acquiring predefined knowledge. Universities typically emphasize moving students swiftly and frictionless through the factory by making them focus on results and exams, rather than reflecting over what and how they learn. As a result, university students are trained to excel in mastering predefined knowledge laid out in professors' elaborate syllabus rather than developing the ability to reflect as part of their future professional roles. These limitations in current educational practices are partly due to lack of emphasis on and proper methods for developing reflective thinking. Another reason is the lack of systematic engagement with practice in educational settings.

As many students today focus too little on attaining new knowledge that might be of use in their future professional role we need as university teachers to find solutions in terms of curricula improvements. Interestingly, Swedish higher education has undergone a series of profound changes recently and a central ambition has been to improve the ways in which higher education prepares new generations of students to the emergent needs of the labor market. The enrolment figures in IS programs in Sweden had a dramatic fall in 2002 and have remained low ever since. The declining enrollment in IS programs not only negatively impacts colleges and departments offering these programs, but it also has a dramatic impact on industry. Against this backdrop, we engaged in designing a new IT Management masters program to 1) to more effectively prepare

students for their future professional roles in industry, and 2) to attract a new generation of young people with an interest in critically reflecting on the dramatic role that IT has in shaping contemporary organizations and industrial practices.

Building on Schön's (1983) model of reflection-in-action and his ideas on educating reflective practitioners (1987), the program highlights the role of practice through close collaboration with industry partners. Our assumption is that this approach will improve learning outcomes and at the same time increase IS enrollment by helping to attract, retain and place students (Koch et al., 2010). At the heart of the presented IT management masters program is thus the belief that students needs to be educated through the "practice of practice" to complement the traditional emphasis on studying the extensive knowledge available in textbooks and academic writing in general. In the following, we present the underlying rationale and design of the program as follows: first we present the theoretical underpinnings in terms of pedagogy and content; second we present how we operationalized a collaborative approach throughout the program; and, finally we discuss opportunities and challenges related to implementing this approach to educating reflective IT managers.

2. EDUCATING REFLECTIVE PRACTITIONERS

Presenting a relevant and up-to-date education for IT-practitioners is a difficult task. Today's rapid technological development implies that the required skills constitute a moving target. As a result, the IS field has a tradition of healthy and ongoing debates over approaches to and institutional settings for education of IT-professionals (Denning, 1992; Leidner and Jarvenpaa, 1995; Dahlbom and Mathiassen, 1997; Denning, 1997, 2000; Woratschek and Lenox, 2002; Prabhakar et al., 2005; Topi et al., 2010). Several key questions related to the design of our educational practices and institutions are continuously posed in this important debate: Do our students acquire the knowledge and skills that are required in today's practices? Do we use the appropriate pedagogical approaches when teaching? While a number of studies have explored fits and misfits of IS curriculums and industry needs in terms of rather specific and formal system development skills (e.g. Woratschek and Lenox, 2002; Janicki et al., 2008) the more generic and situated types of knowledge has gained less interest.

In designing a new IT management master program at the Department of Informatics at Umeå University, Sweden, we decided to take a practice approach to our teaching. The practice approach focuses on the students' future professional roles and assumes that the real world problems they will face are unstructured, ambiguous, and immune to purely technical solutions. Faced with such complex and dynamic situations, professional practitioners adopt a variety of frames and techniques to engage with the situation and understand its unique characteristics. To allow the students to experience such situations and develop the requisite skills, we therefore decided against "simulating real world problems" in the program and instead strived to merge our students' traditional course experiences with elements of industrial practice. In doing so, we recognize how professional practice builds on an iterative and reflective 'conversation' with the situation that Schön (1983; 1987) called *reflection-in-action*. To achieve such effects within the program, we emphasize placing our students in group-based projects, both in the context of shorter courses and in the context of independent, larger projects. Mathiassen and Purao (2002) describe the practice of educating developers in the context of such group-based projects in the model in Figure 1.

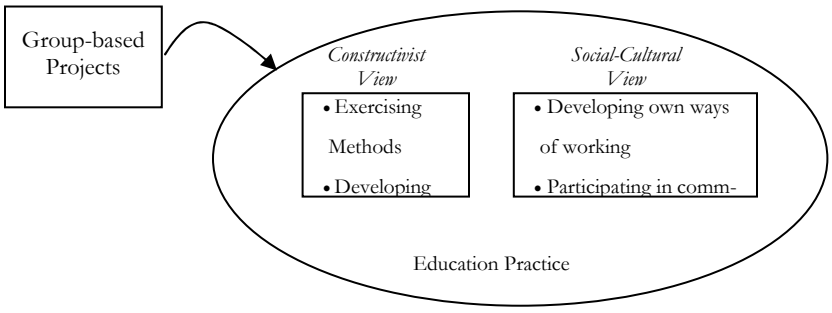

Figure 1. The Role of Group Projects in Educational Practice

The authors argue that the use of practice-oriented group-based projects can serve complementary goals in educational practice. Following a constructivist pedagogical ideal (Leidner & Jarvenpaa, 1995), projects can exemplify prescribed ways

of working, promote discovery of abstractions, and provide opportunities for improving communication and listening skills. While such exercises often are implemented in IS teaching through the use of various methods such as teaching cases and assignments, having students practice with "real-life" problems can motivate them further and introduce the "messiness" professionals face in industry. Hence, building experiences from practice can help students create a better understanding of codified knowledge such as methods and allow them to put it into use. In addition, following a social-cultural pedagogical ideal (Leidner & Jarvenpaa, 1995), projects can help students develop professional ways of working through active participation in the communities-of-practice that emerge through group work. These skills are less well supported in current IS education because students are rarely situated into relevant practices and asked to reflect on their experiences, neither at group nor individual levels. As a result, we suggest that by incorporating reflective practices in projects students are provided better opportunities for developing situated knowledge (Mathiassen & Purao, 2002).

To educate reflective IT managers, we build on this model that combines constructivist and social-cultural ideals to leverage group projects. Following Mathiassen and Purao, we therefore adopted the following basic principles to effectively integrate theory and practice:

- ***Use state-of-the-art methods as training programs***

By decomposing actual challenges facing industry partners' into sub-problems the students are stimulated to reflect on application of methods in two ways. First, the teacher can apply methods on a problem that is limited in scope but still real, allowing students to reflect on selective focus and application methods. Second, when working on small projects based on actual, but still limited, problems students can be stimulated to reflect on how and why they apply methods in certain ways and their experiences from doing so. Scope limitation allows reflection on elements of methods, i.e. how to apply it. The messiness involved with applying methods in practice stimulates reflection on when and why to do it.

- ***Design projects as means to discover methods-in-use***

Projects are the main opportunity for students to apply methods and hence to reflect on in-use experiences. Introducing realism in form of authentic projects where practitioners work as clients or participants in requirements selection exposes students to situations they might face in future professional roles. Designing projects that include iterations and intermediate deliverables increases levels of realism and allow simulation of real development projects.

- ***Design projects as contexts for developing collaborative skills***

Collaboration is an essential part of most creative roles within organizations and certainly for IS professionals. By designing projects that incorporates real-world ambiguity students develops different understandings of problems, ways to solve problems and the solution itself. Negotiations of understandings and coordination among members in the student group allow students to develop collaborative skills and reflect on both their own and others positions.

- ***Challenge students to reflect critically on each project's community-of-practice***

Important parts of professional practice are built on situated elements of knowledge that cannot easily be clearly expressed and learned in other ways than through experiences and participation. Involvement in a group based project also mean engaging in creating and taking part in such a community-of-practice. By critically reflecting on each projects practice students are encouraged to create their own understanding of positive and negative aspects and develop abilities to adapt to different communities-of practice.

- ***Challenge students to develop a personal knowledge profile***

Through proceeding in iterative and reflective steps of self-assessment, definitions and re-definitions of goals, career plans and road maps for competence building etc. the process becomes increasingly focused on student-specific goals and a personal knowledge profile. As the models and methods they use evolve, so should their knowledge profile. That is, learning starts out with getting acquainted with new knowledge and develops towards gradually applying it on more complex tasks. The reflective practitioner approach however also imply that students should develop an ability to value, selectively master areas and also see limitations on the role methods play in developing solutions. Two important conditions need to be taken into consideration in this context: First, the process must not be intermittent, but rather a continuous process of communication between teachers and students. Second, an essential prerequisite for the success of the student's competence improvement is that the courses include learning potentials in relation to the ways in which practice plays a part in the courses. The latter is essential, because academic literature alone is not sufficient for gaining relevant insights into the broader practice processes, which are essential for career advancements.

3. IT MANAGEMENT PRACTICES

Indeed, the practice perspective is an effective way for students and teachers alike to interact with real-world challenges and thus to introduce competencies students need to develop. While practitioners need to be able to reflect on how IS development takes place they are increasingly challenged to also answer why it does so in terms of organizational performance. Hence, an important vantage point for designing the IT Management program was competencies required to effectively manage process development through IT. Grounded in the resource-based view of the firm scholars argue that organizational performance is related to capabilities such as business expertise, relationship building and organizational learning (Peppard et al., 2000; Peppard and Ward, 2004; Bhatt and Grover, 2005). Based on an extensive literature review Peppard et al. (2000) identify six macro-competencies that translates IT resources into organizational performance; formulation of strategy, design of processes and information, exploiting and monitoring, defining supply resources, developing supply resources and finally developing, implementing and operationalizing solutions.

In designing the program our ambition was to give the students experiences from each of the competence fields presented in table 1.

Table 1 IS competencies, adopted from Peppard et al. 2000

Macro-competence	The ability to…	Micro-competence
1. Formulate strategy	*evaluate strategic information and technology based opportunities as part of the business strategy formulation process and define the decision-making environment.*	1.1 Business strategy 1.2 Technology innovation 1.3 Investment criteria 1.4 Information management policies
2. Design processes and information	*translate the business strategy into business processes and information based needs*	2.1 Prioritization 2.2 Information alignment 2.3 Business process performance improvement 2.4 Information innovation 2.5 Business process design
3. Exploit and monitor	*develop and apply exploitation plan and monitor value creation*	3.1 Exploitation planning 3.2 Benefit evaluation
4. Define supply resources	*translate the business strategic vision into long-term information supply resource requirements*	4.1 Infrastructure design 4.2 Technology analysis
5. Develop supply resource	*create and maintain the information supply resource*	5.1 Sourcing 5.2 Supplier relationships 5.3 Technology standards 5.4 Technical architectures 5.5 IS/IT staff development

6. Develop, implement, and operate solutions	*deploy resources to develop, operate and information solutions*	6.1 Service level definition 6.2 Applications development 6.3 Defining Information requirements 6.4 Apply technology 6.5 Systems implementation 6.6 Continuity/security planning 6.7 Change management

For students in general, and IT students in particular, it is critical to find a proper balance between theory and practice. Indeed, the IT field is characterized by rapid changes, which presents a challenge for IT management programs. If IT really is a quickly moving target this must be reflected in the IT management programs. While a development towards increased competition in larger IT projects seems probable we believe that demand for individuals with both an understanding of technology and processes will remain strong. Such an understanding is not easily taught or acquired in a purely theoretical setting. Incorporating participation in communities-of-practice into education is one way of balancing theoretical resources and practice.

The IT Management program is directed towards the intersection of technology and business. In contrast to many fields IS faces a dilemma; we do not have the possibility of isolating study objects and perform experiments or try our ideas on physical objects. In educational settings teaching of essential areas is limited to abstract descriptions and discussions. Technical aspects can be taught by letting students create software or other hands-on solutions. Exercises that include applying theoretical knowledge are harder to create when studying organizational aspects of technology. While abstract discussions clearly stimulates students understanding the practice dimension is an integral part of learning. A widely used tool for simulating such an environment is problem-based learning based on case descriptions. Such methodologies hold many positive learning characteristics, e.g. by providing fixed points on which students can apply abstract knowledge and by stimulating discussions. They are however often quite abstract and present problems that might be outdated and simplified. Also, students sometimes find it hard to relate to them since they are academic products that resemble textbook examples. By incorporating industry problems into the program we hope to provide students with challenging, contemporary and interesting problems. Ambiguous real-world problems also illustrate limitations of methods and allow teachers and students to engage in critical reflection.

In order to leverage the practical experiences a well-developed strategy is essential for incorporating student activities with expectations from industry. Even though such an approach might present teachers with an increased workload and some need for negotiation of understandings, incorporating students in collaborative projects gives them opportunity to problem-based learning at an advanced level.

4. THE IT MANAGEMENT MASTERS PROGRAM

Scandinavian IS research has a longstanding tradition of engaging in collaboration with external stakeholders (e.g. Bjerknes, 1991; Mathiassen, 1999). The department of informatics at Umeå University is no exception, we have very good relationships with external stakeholders, e.g. through partnership networks involving process industries and IT suppliers (for an illustration of the industrial partnerships we are collaborating with, see Holmström et al, 2010). In these collaborations partners emphasizes a large recruitment need and a shortage of skilled labor. The collaboration has created close ties that allow us to incorporate important actors within the local IT industry. In this section we present the program in general and five domains in particular where we have immersed the practice dimension in the program.

4.1 Description of the IT Management Program

Most academic programs in Sweden is based on a principle where students take one course at a time, the IT management program does not differ in this sense. An academic year is divided into two semesters, each corresponding to 20 weeks of full time studies. One week of studies corresponds to 1,5 credits, 15 credits is thus 10 weeks of studies (1/2 semester) and 30 credits 20 weeks (a semester).

The competencies identified by Peppard et al. (2000) are covered in four core courses; IT Innovation, IT Development, IT Strategy and IT organization. In designing the order two major premises were considered. First, IT is approached outside-in, i.e. starting with its purpose and impact for customers and society and then focus move towards its inner logic and function. This order also is in line with that of Peppard et al. (2000). Second, up until recently Swedish Master programs has been one-year educations and that option still persist for students. Hence, in order to meet these requirements an iteration is designed where the first year cover competencies one to four and the second year starts with a deeper investigation of one and two, The courses are listed below with a short description, the sequence is the same as in the program. We then proceed with describing competencies covered and ways in which practice dimensions are intertwined with each course.

IT Innovation, 15 credits
As new technologies constantly evolve, organizations need to stimulate innovation of IT and processes if they are to maintain their competitiveness. During the course we will discuss various types of innovation (such as radical and incremental) in technology, IT-based services and processes.

IT Development, 15 credits
The course covers the development and use of IT in organizations discussed in form of implementation of specific technologies and activity support as well as concepts such as IT diffusion and IT adoption. During the course topics such as the management of projects is also covered. This course deals thus with the individual, organizational and technical prerequisites for development of IT support.

Elective Course, 15 credits
The program deals with issues at the intersection between IT and organizational aspects and is thus designed to attract students with different backgrounds. During this period student are given the chance to further specialize in their previous area or take a course that complement their previous specialty.

IT Strategy, 15 credits
During this course, IT strategy and its importance to organizations' development and survival is studied. Different approaches to the relationship between technology and activities and their impact on organizations' ability to create and maintain competitive advantage are discussed. Examples of topics covered include organizational agility, Digital options, Decision Support and Organizational Learning.

IT Organization, 15 credits
The course deals with management and control of IT resources in an organization, issues that fundamentally affect the conditions for creativity and efficiency. Topics included range from planning of information systems, IT investment, performance evaluation and alternative sources of supply of IT services

Research Methodologies, 15 credits
The course covers various types of epistemological perspectives and methods used to conduct research in the IS discipline. This is achieved through introduction and reflection on subjects such as research design, literature studies, and collection of data, data analysis and presentation of research.

Project/Thesis, 30 credits
The course provides students with the opportunity to apply a scientific oriented approach in conjunction with independently and critically formulating and solve problems in the subject of IS. The course includes project selection, problem definition and delimitation, problem solving and preparation of a written report. The written report is presented at a student conference arranged by the department.

For each and every course we have outlined (1) what the macro-competencies covered are; (2) what the main industry actors are for the particular course, and (3) how the practice element is aligned with the particular course:

Table 2, Practice elements in courses

Course	Main macro-competence	(Main) Involved industry actors	Example of practice element

	covered		
IT Innovation	1. Formulate strategy 2. Design processes and information	Users and suppliers of both hardware and software	Case assignments such as development of innovation strategies and analysis of how IT enabled process innovation can be supported, analyze successes and failures within organizations.
IT Development	3. Exploit and monitor 4. Define supply resources	IT consultant firms	Case assignments on IT implementation and development of IT support in processes
Elective course	Students choice	NA	NA
IT Strategy	1. Formulate strategy 2. Design processes and information	CIO´s, business managers	Analysis of existing enterprise level IT and business alignment, business process support.
IT Organization	5. Develop supply resource 6. Develop, implement,and operate solutions	CIO´s, IT departments, project managers	Analysis of existing organization of IT supply, development of alternative organization.
Research Methodologies	NA	NA	NA
Project/Thesis	Students choice	Varying	Analysis and suggestions on improvement of existing practices.

4.2 Live Cases

Students are introduced to live cases in these courses, either by a number of study visits to different companies, or by company representatives coming to class presenting a live case for them to work on. These live cases deal with issues that the participating company faces that are related to the specific course. Analytical tools and models are introduced and students shall then apply them by working on possible solutions for the live cases. In this way, the learning process will be anchored in reality and new knowledge and skills can be attained in innovative ways. The end products from activities will also be presented and discussed with representatives from these companies, hence stimulating reflections of own practices, methods and solutions.

4.3 Guest Lectures

High-profile speakers are regularly invited to meet with the students to present their professional challenges and set up a practice-oriented dialogue on current issues related to IT management. While this resembles the live cases these guest lectures deals with topics of smaller range. Also, the live cases will in general be dealing with challenges facing companies. These guest lectures are to a larger degree about success stories and "best-practice".

4.4 Master Theses in Collaboration With Practice

The last course of the program covers a whole semester and allows for students to address a specific problem in detail. While most students in the past have done their master thesis on a practical problem involving practice the basic idea is that through introducing students to industry actors at earlier stages of their education they will improve collaboration skills and create ties to certain companies.

4.5 Participation in Research Projects

Throughout the program an explicit ambition is to find synergies between ongoing research projects and education. Although most of the students will pursue a career in industry, higher education also has the purpose of preparing students for an academic career. Regardless of which path the students are interested in, incorporating their efforts with research projects can provide a better understanding of how business problems can be examined. Working closely with faculty allows students not only to get a better understanding of industry but also of research practices. In a sense, this can help "students learn how to learn". Also, input from student projects offers partner companies with smaller but more frequent inputs while researchers can make use of their work to better understand problems.

4.6 Partner firms

There is a list of partner firms associated with the IT Management Master Program. We are deeply dedicated to deepening the program's mission and commitment to create an impact through our work with our partners. These partner firms participate in a variety of ways – providing feedback on the curriculum, opening up some key challenge as a live case, giving guest lectures, or collaborating with student group for their master theses. They also participate in research projects with the IT Management Group at the department, which allows teachers to keep updated on challenges facing contemporary organizations.

5. CHALLENGES AND OPPORTUNITIES

The key idea underlying the IT Management program at Umeå University is that a balance between theory and practice characterizes a strong educational program. The practice element can help us shed explanatory light on the theoretical elements in the program, just like the theoretical tools we introduce in the program can help students to better understand practice. In our minds the practice element in the program is essential, as the dramatic increase in the role of IT in business and public organizations lately underscores the ways in which IT has become an inseparable part of organizational life in all sectors including industry, government, healthcare, and education. Clearly, ensuring that IT delivers a value to organizations is an important issue to IT managers in all firms today. A challenge, then, is to prepare our students for tackling the pervasive role of IT in their future professional lives.

There are a number of challenges we are faced with in seeking to strike a balance between theory and practice in the program. First, how do we deal with the fact that IT practice is a quickly moving target? Indeed, along with the emergence of IT in societal life, businesses everywhere are undergoing rapid and significant change, and across a wide range of business markets, IT is rising above and beyond its traditional 'back office' role and is evolving towards a 'strategic' role with the potential not only to support chosen business strategies, but also to shape new business strategies. We believe that this challenge is a critical one, and one that is not easily dealt with. Working closely with partner firms is, in our minds, a good way of addressing the challenge. For each core partner firms contribute with real-world problems and therefore the program can continuously address new and emerging problems.

Second, how do we implement the reflective practitioner approach? While the approach holds many promises, it is not completely aligned with interests of two key stakeholder groups. It must be said that most, if not all, partner firms are concerned with issues that are more operational than strategical in character. When working with partner firms in designing the program the partners from the IT industry initially raised issues such as 'how do we speed up IT development projects?' and 'how can we ensure IT projects deliver in time and on budget?' We saw two problems with this. First, while these issues are important they can be troublesome for stimulating reflection on practices. Instead they risk enhancing naïve perspectives related to non-rigorous use of methods. Second, by prioritizing IT development use of technology risked becoming put to the background in terms of learning. These issues are also directed towards the IT development industry and we would run the

risk of alienating other types of firms if such a perspective would be prioritized. We dealt with this by addressing strategic issues at the core of the course design. In practical terms we discussed with research colleagues in the US as well as in Europe to see how strategic issues are addressed at leading university master programs. In doing this we told the IT industry partner firms that they were more than welcome to introduce operational problems as live cases, but that the students would be prepared to look at operational problems from a strategic lens. We also made an effort to align firms from other industries than the IT industry as partner firms, thus ensuring that the development perspective that is natural for IT firms is combined with a use perspective that is natural for firms hosting IT infrastructures. In terms of teachers the approach can be considered more time demanding. We sought to incorporate prospective teachers at an early stage of program development, which hopefully has led to an increased understanding of potential advantages. Also, all of these teachers actively conduct research within their area of expertise. We have promoted the combination of collaborating with practice and reflective exercises as opportunities for enhancing their own skills.

Third, how do we lower the threshold for students as they enter their professional lives? Clearly, this is not only tied to what they work with in the master program, but also with how they work. As noted earlier our educational philosophy builds on Schön called *reflection-in-action*. Building on this ideal we have sought to work with our students in group-based projects, both in the context of shorter courses and in the context of longer project work. Group- based projects (Mathiassen & Purao, 2002) is an element in all courses, and we firmly believe that organizing student project similar to the way development is organized in IT practice is a way to lower the threshold for students as they enter their professional lives.

6. CONCLUSIONS

We have discussed the ways in which practice comes into play in the IT management master program at Umeå University, Sweden. The program was designed considering the competencies the students need in their future professional roles. The basic premise lies in the use of reflection-in-action as an approach to presenting students with practical problems throughout the program. Since the program is given for the first time fall 2011 it is still to early to draw any conclusions in regard to impact on students learning and enrollment. Nevertheless the initial enrollment numbers seem promising. Despite the fact that the fall semester of 2011 is the first semester when non- EU students are not given free education in Sweden the number of applicants was 25. In comparison to the program that it replaced, with 4 applicants, these numbers are indeed promising. We believe that the students are in part attracted by the practical elements in the program.

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