

CHALLENGES OF SUPERVISING STUDENT PROJECTS IN COLLABORATION WITH AUTHENTIC CLIENTS

Maritta Pirhonen

*Department of Computer Science and Information Systems, University of Jyväskylä
Mattilanniemi 2, Jyväskylä, Finland*

Keywords: Project-based learning, Project management education, Supervising.

Abstract: There is a growing need for qualified project managers in the field of IS. The competencies and skills needed in project managers' work can not be learned only by reading the books. What kind of challenges does this bring to educators and educational systems, especially in universities? These challenges include such as, how to teach management and leadership skills and social competence needed in IS project management? Project-based learning (PBL) is an approach that enables students to learn management and leadership skills successfully in a working life driven project. PBL has proved to be an effective approach for learning skills and competencies demanded in project working. However, using PBL method alone does not guarantee learning result. In order to be successful, PBL method requires effective and competent supervision and guidance of students. This article focuses in supervising work-related project learning carried out in collaboration with authentic clients.

1 INTRODUCTION

In information systems development (ISD) work is increasingly organized as projects. Information systems (IS) projects are complex and difficult to manage because a software project can involve software development, maintenance or an enhancement to software (Schwalbe, 2004). Given the role of the IS project manager, interestingly, many argue that technical skills are not as important as non-technical abilities in the areas of teamwork and communications, and self-awareness (Faraj and Sambamurthy, 2006; El-Sabaa, 2001; Brewer, 2005; Gillard, 2005; Turner and Muller, 2006). Project work requires an ability to work as apart of a group, to plan the work, to make decisions as a group, and to communicate. The leadership skills of the project manager in IS projects are an important factor contributing to the success of the projects (Faraj and Sambamurthy, 2006; Bloom, 1996; Turner et al., 2005). Effective project manager must have good written and oral communication skills and adequate technical competence to manage the IS project. Pinto and Kharbanda (1996) emphasize the increased need for qualified project managers. Jurison (1999) state that project managers' broad experience with managerial and interpersonal skills is a basis for successful projects.

Therefore, it is very difficult to find an experienced and available project manager with right qualifications.

What kind of challenges does the growing need for the qualified project managers in IS field bring to the educational systems, especially universities? In response to challenge is to use project-based learning approach for learning skills needed in project work. Focusing on "real work" is a key means of motivating students to apply competency to an action. Pirhonen and Hämäläinen (2005) state that working life driven projects with close co-operation and interaction with industrial and business life may motivate the students to study - not just to take a degree. Moreover, project work makes it possible for students to apply theoretical knowledge to practice (Rebelsky and Flynt, 2000; Byrkett, 1987), which is important for the development of expertise (Bereiter and Scardamalia, 1993; Leinhardt et al., 1995; Tynjälä et al., 2003; Tynjälä, 2008a, 2008b). In terms of expertise, it is also worth mentioning that project studies may enable students to participate in the creation of new knowledge rather than confining themselves to the acquisition of existing knowledge.

However, using PBL method alone does not guarantee learning result. In order to be successful,

PBL method requires effective and competent supervision and guidance of students.

This paper is organized as follows. First, pedagogical background for project-based learning is reviewed. Then a particular model of this pedagogical approach based on studies in the field of information systems and the model of supervising are presented.

2 PEDAGOGICAL BACKGROUND OF PROJECT-BASED LEARNING

Project-based learning (PBL) refers to a theory and practice of utilizing real-world work assignments on time-limited projects to achieve mandated performance objectives and to facilitate individual and collective learning (Smith and Dods, 1997). A project-based learning method is a comprehensive approach to instruction. It is a learning model that involves students in problem-solving tasks and allows students to actively build and manage their own learning. PBL is linked to a theory of constructive learning that entails a shift in learning objectives. The underlying principle is the assumption that learning occurs during unstructured, complex activities (Helle et al., 2006).

Developing generic skills such as teamwork is an inseparable element in many models of project-based learning: teamwork is an inherent part of a project. Students involved in projects practice a vast range of skills in areas of project management, teamwork, and communications technology – and also in self assessment. Often collaboration skills are put into action by the collaborative nature of project management. In fact, recent studies have suggested that project work may have many educational and social benefits (Moses et al., 2000), such as the development of communication skills (Pigford, 1992), along with team-building and interpersonal skills (Roberts 2000; Ross and Ruhleder, 1993). Working process of a group is supported by supervisors who guide and assist students in independent learning and information retrieval. Teachers supervise the project process, and monitor the progress and a performance of students.

Project work in the field of information systems gives students the possibility to prepare for professional practice by producing plans, managing schedules, interviewing users and meeting project deadlines (e.g. Oliver and Dalbey, 1994. According to Hakkarainen et al. (2004), the knowledge-creation

perspective is the most dynamic aspect of expertise, from both the individual and the societal perspective. For this reason it is important to support knowledge-creation activities during university studies (see also Helle et al., 2006).

3 A DESCRIPTION OF THE PROJECT-BASED COURSE

The main goal of the project course is to provide the students with opportunities to gain authentic practical experience of information systems projects (see Table 1 for a more specific description of what constitutes these skills are and how they are acquired).

Table 1: The learning goals and the implementation of the project course (Pirhonen & al. 2005, p. 35).

Learning objective	What?	How?
Group work skills	Goal-oriented and responsible action, recognizing stages of group development, spirit of the group, the own role in the group	Allocating the tasks equitable to the group for attaining the project objectives, weekly meetings with the supervisor, group meetings, discussions, peer reviews
Communication skills	Negotiation techniques, meeting practices, ability as a public performer, speech and written communication	Group meetings, meetings with client, supervisors, and project managers, steering group meetings, seminars, presentations, agendas, memos, minutes, e-mail
Project work skills	Project management, following through the project	Project plan, phase plans and reports, weekly plans and reports, inspection meetings, steering group meetings, acting as a project manager, lectures given by experts, theme seminars
Expert in the technical content of project	The knowledge of the project content	Acquaint oneself with the project scope, identifying the training needs, school oneself, the planned use of recourses of the client and the support group

The learning goal is to provide a comprehensive and realistic view of information systems experts' work in both project management and implementation of the task. Further objectives include familiarizing the students with the tools and methods of the project domain, acquisition of project management skills, leadership and group work skills, communication skills, and technical competence.

3.1 Learning Environment

The learning environment is maintained in coordination with three parties – the student group, the university, and the client organization (Figure 1).

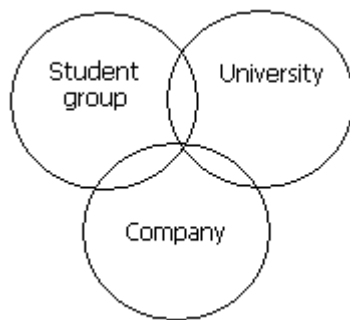


Figure 1: The actors in the learning environment.

A written cooperation contract between the three parties is drawn up before the project starts. It covers the subject matter (a description of the project objectives), the obligations and rights of the contracting parties, copyrights, guarantees and maintenance, confidentiality and the concealment of confidential information, payments and the payment schedule.

The project course is carried out between September and March (26 weeks). The course starts with lectures and orientation exercises for the students. The students form their groups of four to five members before the task-exhibition session at which the client representatives present the project assignments. After this session the student groups negotiate the distribution of the project tasks. During the course each student is expected to use 300 hours for implementing the project task and 100 hours for demonstrating project management and project work skills, including group leading, group work, and communication. A record of the working hours divided to the tasks is kept. The groups plan their work, complete the scheduled tasks assigned, and produce deliverables. Each student is expected to take the role of project manager and project secretary. These roles rotate every month and therefore each member of the project group works in both roles once. In total, a five-student group uses 1,500 hours in planning and implementing the client project. The collaboration ends with a steering group meeting at which the results of the student project are accepted.

3.2 Project Assignments

The client typically represents a firm such as a software house or the IT department of an industrial organization. The tasks range from extreme coding projects to developmental projects and research. They are typically ill-defined and therefore there may be a need to clarify the task as the project proceeds. The teachers have responsibility for procure-

ment of project assignments. They contact organizations and negotiate for possible project subject. In co-ordination with the potential clients, feasibility of the overall project concept is developed and assessed. In the beginning of the course the assignments are introduced to the students by the clients.

3.3 Project Organization

The project organization comprises a group of between five students, supervisors, and client representatives (see Figure 2).

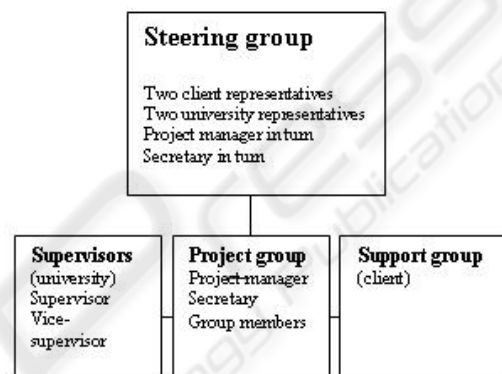


Figure 2: The organization of the project.

The steering group is selected during the initial stage and consists of representatives of the client organization, the university (supervisors) and the project team (the project manager and secretary in turn). It represents the highest authority in terms of decision-making, and decides on matters concerning the plans and issues related to the redefinition of the project content. One of the client representatives chairs the group meetings and the project-team manager has the role of a presenting official. Experts or consultants may also be invited to the steering-group meetings. The support group includes the network set up by the client, which provides the project group with content-related professional help when needed.

3.4 Project Group

The project group consists of four to five students. The role of the project manager and the secretary rotates every month so that each member of the project group takes both roles once. The project manager is responsible for the following:

- coordination and communication with the client
- maintaining the project plan
- present the proposal to the steering group

The project secretary is responsible for keeping a record of meetings and writing memos and minutes. The project group carries out the project tasks within the limits of resources available and every student is responsibly for the quality of his/her work. Students are expected to review each other's work to give feedback.

After the group members have committed themselves to the task from those offered by the organizations of business and industry they get acquainted with the client organizations by visiting the client company. They create different forms of communication channels, such as electronic mail, phone, and personal contacts. After familiarizing themselves with the project scope and tasks involved, the project manager formulates the preliminary project plan in co-ordination with the group and the client. Since the project plan is reviewed by the client and the supervisors the revised project plan is approved by the steering group. The steering group has a meeting an average of five times during the project.

3.5 Assessment

The student group is assessed twice during the six-month period of the project. The first one takes place in the middle of December after three months work. The second assessment is carried out at the end of the project in April. The content of the assessment is grouped and structured around the themes covering issues to the course's objectives and critical to the effective project management. The course grade for individual student is calculated on the basis of the following assessment framework:

- planning (25%)
- communication and co-operation (20%)
- group work (25%)
- attitude (10%)
- outcome (20%)

The assessment process is organized so that both the teams and the supervisor write up an assessment report using the assessment framework. The assessment is based on the perceptions of the team work and documentation of the project process. The assessment of the project outcomes is made by the client. After the written assessments are delivered, both supervisors and the team discuss and reflect the project in order to find out the causes of the success or the failure of the project. The grading of the course is mainly based on the debates that emerged in the discussion about written assessment. If needed, both supervisors and students have the right to suggest an individual grade for the student differ-

entiating from the one given to the group. If these personal grades are given, they are based on a unanimous decision from all parties participating to the grading process.

4 SUPERVISING

Effective and competent supervision and guidance of students is a vital part of a project-based learning method; PBL method alone does not guarantee learning result. Especially in the early stages of the project, the role of the supervisor is vital in supporting communication and cooperation with the client. The experiences of supervisors have shown that the start-up phase needs to be conducted in a systematic way if it is to contribute positively to the project work.

During the project the students are supervised both by university teachers and by client representatives. The idea is that technical guidance should come from the client whenever possible, because they have the knowledge of the specific technological requirements. University provides more generic guidance concerning the project work. Supervisors have responsibility for the fulfilment of the academic learning objectives (see Table 1) only, not for project results to the client or for guiding the technical content of project. Supervisors guide the students in finding the essential aspects in order to carry out the project successfully. Decision-making is left to the group, although the supervisor may provide a timeline for the process. The supervisor takes also part in the meetings with the client. After the meeting the group and the supervisor analyze the meetings together.

Each project group have two supervisors from the university from which one acts as a vice supervisor. The supervisors are the facilitators and/or coaches who promote the collaboration and provide support and guidance. Supervisors also have an important role in promoting students' self assessment on their work. Their obligation is to provide an environment for the group where the student can ask questions when needed and to direct students to use actively instruction and expert recourses available. Supervisors support students' personal growth and development as well as guide processes of groups.

In order to support the development of reflective evaluation of the students, the groups are asked to formulate plans, track progress, construct and test alternative solutions and evaluate their hypothetical consequences. Students keep a learning diary in weekly basis, which contains reflection on their

work and learning process. The project manager in turn writes up the weekly reports and plans as well as learning diaries. All documents are stored in the digital learning environment (Optima). This enables supervisors and group members becoming acquainted with the documents before the guiding meeting. The meeting between the supervisor and the group takes place weekly. The main objective of the meetings is to critically evaluate working and learning of the students. During the meetings, the weekly project reports and project plans are discussed. The project manager and team members report on the state of the project, which is compared with the documented expectations in the project plan. Issues that may possibly cause problems during the project are discussed as well. The project secretary writes memos of meetings, which are also stored in Optima. Memos are checked in the next meeting. Between the meetings supervising is arranged mainly by e-mail.

5 CONCLUSIONS

The challenge of the higher education institutions is to provide opportunities for students to apply and develop their knowledge and competencies needed in the world of work. In the field of Information Systems it is essential to learn skills of project management. Project-based learning approach is process orientated and the students have responsibilities for managing the project (timeline, quality, decision making etc.) and group work.

However, there are some barriers that will prevent educational institutions from applying PBL. Setting up a market-driven project learning course may involve some difficulties.

Project based learning method alone does not guarantee good learning result. Effective and competent supervision and guidance of students is a vital part of a project-based learning method. In practise, it is difficult to find experienced teachers with right qualifications. This may be caused by resistance among teaching staff because teachers are not prepared and experienced enough to handle open and complex learning situations. Good supervisors of the working life driven projects should have multitude skills. They need to have understanding of learning processes alongside a project task. Their task is to provide an open and convenient learning environment for the students. Supervisors should also promote collaboration, provide support and guidance, and design a grading procedure focusing on the learning process alongside the evaluation of

the project work. In addition, a challenge from teachers' point of view is the procurement of project assignments. Teachers need to have wide social network with the representatives in working life in order to find appropriate project tasks.

Moreover, the learning project designed for business purposes may cause moral conflicts between the actors (Vartiainen, 2007). In some cases, the main objective of the client organisation is to have a complete system, whereas the most important goal from the students' point of view is the acquisition of knowledge and skills for working life.

After all, learning results from the courses using PBL are comprehensive and transferrable to the world of work. However, we need further studies on how to train and motivate teachers to act as supervisors. Is PBL a solution for this issue?

ACKNOWLEDGEMENTS

I wish to thank the anonymous referees, Eliisa Jauhainen, lecturer Mikko Jäkälä, and Minna Silvennoinen their insightful feedback in the development of this study.

REFERENCES

- Bereiter, C., Scardamalia, M., 1993. *Surpassing ourselves: An inquiry into the nature of expertise*. Chicago: Open Court.
- Bloom, N.L., 1996. Select the right IS project manager for success. *Personnel Journal*, 75(1), 6-9.
- Brewer, J.L., 2005. Project managers: can we make them or just make them better? *SIGITE '05: Proceedings of the 6th conference on information technology education*, pp. 167-173.
- Byrkett, D.L., 1987. Implementing Student Projects in a Simulation Course. In *Thesen, A., Grant, H., Kelton D., (Eds.) Proceedings of the 1987 Winter Simulation Conference*, pp. 77-81. New York: ACM Press.
- El-Sabaa, S., 2001. The Skills and Career Path of an Effective Project Manager. *International Journal of Project Management*, 19(1), pp. 1-7.
- Faraj, S., Sambamurthy, V., 2006. Leadership of Information Systems Development Projects. *IEEE Transactions on Engineering Management*, 53(2), pp. 238-249.
- Gillard, S., 2005. Managing IT Projects: Communication Pitfalls and Bridges. *Journal on Information Science* (31)1, pp. 37-43.
- Hakkarainen, K., Palonen, T., Paavola, S., Lehtinen, E., 2004. *Communities of networked expertise: Professional and educational perspectives*. Amsterdam: Elsevier.

- Helle, L., Tynjälä, P., Olkinuora, E., 2006. Project-based learning in post-secondary education – theory, practice and rubber sling shots. *Higher Education*, 51(2), pp. 287–314.
- Jurison, J., 1999. Software Project Management: the Manager's View. *Communications of Association for Information Systems*, 2, Article 17.
- Leinhardt, G., McCarthy Young, K., Merriman J., 1995. Integrating professional knowledge: The theory of practice and the practice of theory. *Learning and Instruction*, (5)4, pp. 401-408.
- Moses, L., Fincher, S., Caristi J., 2000. Teams work (panel session) in Haller S. (ed.) *Proceedings of the thirty-first SIGCSE technical symposium on Computer science education*, March 7-12. Austin, USA. New York: ACM Press, pp. 421-422.
- Oliver, S.R., Dalbey, J., 1994. A software development process laboratory for CS1 and CS2. *Proceedings of the twenty-fifth SIGCSE symposium on Computer science education*, New York: ACM Press, pp. 169-173.
- Pigford, D.V., 1992. The Documentation and Evaluation of Team-Oriented Database Projects. *Proceedings of the twenty-third technical symposium on Computer science education*, Kansas City, Missouri, United States. New York: ACM Press, pp. 28-33.
- Pinto, J., Kharbanda, O., 1996. How to Fail in Project Management (Without Really Trying). *Business Horizons*, 39 (2), p. 45.
- Pirhonen, M., Hämäläinen, R., 2005. *Oppimispoluille ohjaamassa: Eväitä oppimisprojektien ohjaajille (Guiding towards learning: resources for instructors of learning projects)*. Jyväskylän ammatti- korkeakoulun julkaisuja 50. Jyväskylä. (in Finnish).
- Rebelsky, S.A., Flynt, C., 2000. Real-World Program Design in CS2 The Roles of a Large-Scale, Multi-Group Class Project, *SIGCSE 2000*, Austin, TX, USA. New York: ACM Press, pp. 192-196.
- Roberts, E., 2000. Computing education and the information technology workforce. *SIGCSE Bulletin* (32)2, pp. 83-90.
- Ross, J., Ruhleder, K. 1993. Preparing IS Professionals for A Rapidly Changing World: The Challenge for IS education. In Tanniru, M.R., (ed.) *Proceedings of the 1993 Conference on Computer Personnel Research*, St Louis, Missouri, United States. New York: ACM Press, pp. 379–384.
- Schwalbe, K., 2004. *Information Technology Project Management*. Boston: Thomson Learning Inc.
- Smith, B., Dodds, R., 1997. *Developing Managers Through Project-based Learning*. Aldershot/Vermont: Gover.
- Turner, R., Müller, R., 2005. The Project Manager's Leadership Style as a Success Factor on Projects: a Literature Review. *Project Management Journal*. 36(2), pp. 49-61.
- Turner, R., Müller, R., 2006. Choosing Appropriate Project Managers: Matching Their Leadership Style to the Type of Project. *Project Management Institute*. Newton Square; USA.
- Tynjälä, P., 2008a. Perspectives into learning at the workplace. *Educational Research Review* (3)2, pp. 130-154.
- Tynjälä, P. (2008b) Connectivity and transformation in work-related learning. Theoretical foundations. In Stenström, M-L., Tynjälä P., (eds.) *Towards integration of work and learning. Strategies for connectivity and transformation*, Springer, pp. 11-37.
- Tynjälä, P., Välimaa, J., Sarja, A., 2003. Pedagogical perspectives on the relationships between higher education and working life. *Higher Education*, (46)2, pp. 147-166.
- Vartiainen, T., 2007. Moral Conflicts in Teaching Project Work: A Job Burdened by Role Strains. *Communications of the Association for Information Systems*, (20), pp. 681- 711.