

A Project-based Learning Internship for IT Undergraduates with Social Support from a Social Networking Site

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Abstract

Project-based learning provides students an authentic learning experience in which they are able to practice skills by constructing a sharable artifact. Internships are another approach in which students are given a real life work experience by being placed and working in an actual workplace. Thus, in this paper, we present an exploratory case study of a project-based learning internship in which seven undergraduate IT students were recruited to work on individual projects under the supervision of academic staff members. Additionally, a social networking site (SNS) was used by the interns and supervisors to determine its suitability for this particular environment. The SNS was used as it is conducive with project-based learning since they both have a strong social focus.

It was found that the structure of the internship and the design of the projects were appropriate as positive results were obtained. Both supervisors and interns enjoyed the internship and the interns underwent a significant learning experience. The SNS was not found to be particularly useful for the environment in this study. This is primarily due to interns being close in terms of geographical proximity and time. It should be noted that the interns were working on independent projects and there was little value for them to communicate with each other in regard to their projects.

Keywords: internship, project-based learning, social networking site, Web 2.0, constructivism

1. INTRODUCTION

An information systems professional is expected have a number of soft skills, such as communication, collaboration, organization, decision-making, conflict resolution, leadership, social, and critical thinking skills (Cheong, 2010). These soft skills are difficult to teach

by simply covering traditional teaching material. Instead, it is important to practice and develop these skills through experience.

Project-based learning is one appropriate approach to practice and develop these skills as it is focused on "learning by doing" (Dewey,

1933). A particular strength of project-based learning is its social learning element. With the advent of Web 2.0 technologies, their suitability for educational uses is becoming more apparent. Social networking sites seem to be conducive to project-based learning as they both have a strong social focus. To further ensure students receive an authentic experience of a real life workplace, an internship is another good approach. In such internships, students actually work in a real workplace and carry out real world tasks.

Thus, in this paper, an exploratory case study in developing an undergraduate summer internship program using project-based learning supported by a social networking site is explained and analyzed. The primary focus of the study is the project-based learning component and the use of a social networking site to support the social aspects of the internship is peripheral.

The internship program ran for a period of two months during the summer vacation (in the southern hemisphere). In total, seven interns were employed to individually work on seven different projects under the guidance of academic supervisors. The projects were complex real world tasks. The purpose of the internship is to provide high achieving students the opportunity to further excel by challenging them with these projects, and supporting and mentoring them to meet these challenges.

The project-based learning internship and the use of a social networking site to support its social aspect online is analyzed and evaluated in this work.

2. BACKGROUND

Related to this research are the project-based learning approach and Web 2.0 technologies, in particular, social network sites. The connection between the two is made through the social aspects of learning (Salomon, Perkins, Ohlsson, & Lourenco, 1998) and constructivism.

Project-based learning is a learner-centered pedagogical approach in which learning is organized around authentic problems. The main concept of the approach is that learners are presented with a real world problem to address or solve. Learners actively engage with other learners or their environment to carry out necessary tasks with the instructor assuming the

role of a facilitator, coach, or Socratic questioner (Thomas, 2000).

There is no consensus on the definition of project-based learning, however, common definitions broadly describe the projects as tasks that are complex, learner activities that involve design, problem-solving, decision-making, or investigative tasks (Thomas, 2000). Learners operate with a great degree of autonomy and the projects result in a final artifact constructed by the learners (Thomas, 2000). A more specific definition, describes seven distinguishing characteristics of project-based learning as (Grant, 2002):

1. an introduction to "set the stage" or anchor the activity;
2. a task, guiding question, or driving question;
3. a process or investigation that results in the creation of one or more sharable artifacts;
4. resources, such as subject-matter experts, textbooks and hypertext links;
5. scaffolding, such as teacher conferences to help learners assess their progress, computer-based questioning and project templates;
6. collaborations, including teams, peer reviews, and external content specialists; and
7. opportunities for reflection and transfer, such as classroom debriefing sessions, journal entries and extension activities.

In this work, we follow the aforementioned seven distinguishing steps as they are more detailed and, hence, more appropriate for implementation.

Project-based learning has a number of benefits. In general, it helps prepare learners for skills required in the workplace, such as critical thinking and collaboration. Theoretical foundations of the approach include constructivism and constructionism. Constructivism (Brown, Collins, & Duguid, 1989; Grant, 2002; Perkins, 1991; Piaget, 1969; Vygotsky, 1978) is based on "learning by doing" (Dewey, 1933). That is, learners create or construct knowledge by interacting with their environments and building upon their current knowledge. This leads to different knowledge constructions for individual learners (i.e., it is learner-centered) as each learner has different initial knowledge sets and will have differing interactions with their environments.

Constructionism (Grant, 2002; Kafai & Resnick, 1996; Papert & Harel, 1991) extends constructivism as it involves learners not only constructing knowledge, but also constructing an artifact that they are able to reflect upon and share with others. This approach engages learners, as the artifacts must be personally meaningful to each individual who created them.

Although project-based learning is beneficial for learners as it promotes deep learning, it is not without its disadvantages. The main difficulty is that changes to the curriculum, method of instruction, and assessment methods must occur at the same time (Barron, et al., 1998). However, to address this difficulty, four design principles for devising project-based learning can be used (Barron, et al., 1998):

1. Learning-appropriate goals;
2. Scaffolds that support both learner and instructor;
3. Frequent opportunities for formative self-assessment and revision; and
4. Social organizations that promote participation and result in a sense of agency.

Learning-appropriate goals refer to devising projects such that there is a clear connection between project tasks and the knowledge that the learners might construct. This is important as learners might get carried away with simply completing tasks without reflecting on their actions (Barron, et al., 1998). Thus, opportunities for reflection (characteristic 7 and design principle 3) are an important part of project-based learning.

The projects presented to the learners are complex tasks that the learners will not be able to achieve without assistance. Thus, the (instructor in the role of the) facilitator must provide supporting structures to help guide and assist learners towards achieving the project. This may be in the form of coaching/mentoring, providing material, or eliciting articulation (Barron, et al., 1998).

Feedback, in the form of formative self-assessment and revision is also important to guide learners through the project. As the learners each work towards developing an artifact that is explicit, concrete, and sharable (Blumenfeld, et al., 1991), the artifacts can be used as a basis for feedback and discussion.

Using social structures to support the learners also play an important part in designing an effective project-based learning experience. These can be in the form of small group interactions, opportunities to contribute, peer review, and accessing and analysis how others have addressed the same or similar problems (Barron, et al., 1998).

The social aspect of project-based learning is important for success. Communication is typically carried out as face-to-face interactions, however, it can also be carried out by use of social and communication technologies. This is especially appropriate in this era as today's learners use these technologies, such as social networking sites, intuitively.

Social networking sites (SNSs) allow individuals to present themselves, articulate their social networks, and establish or maintain connections with others. There are a variety of SNSs; popular examples include sites such as Facebookⁱ, LinkedInⁱⁱ, and MySpaceⁱⁱⁱ.

3. SUMMER INTERNSHIP PROGRAM

In the summer internship program, all the interns were recruited from an information systems program in which a blend of business and IT courses are taught. As mentioned previously, seven interns were employed in total and they were each assigned an individual project to complete in two months. They were also assigned academic supervisors to guide them through the project.

Internship Structure

The organizational structure of the internship was as follows. The internship coordinator oversaw the entire internship. This included inviting academic staff members to participate as supervisors and to propose projects, recruiting high achieving students as interns, and assigning interns to projects (and thus supervisors). Once interns were assigned to projects they collaborated with their supervisors in all aspects of the project. That is, the interns and their respective supervisors formed a small project-based team.

Although each intern was assigned to a different project, they were introduced to each other and encouraged to socialize and assist each other to promote both a scholarly and collegial working environment.

Internship projects were structured so that they clearly matched the seven distinguishing

characteristics of project-based learning (refer to the Project-based Learning section). This focused more on the activities and the processes the academic supervisors undertook within each project with the interns and are elaborated upon next.

On the very first day, the internship coordinator conducted an induction session with all the interns. In this session, the internship coordinator briefed the interns on the organizational structure of the internship, and what was expected of them. The school's administrative manager gave the interns a tour of the workplace, introducing them to staff members, and pointed out important places, such as fire exits. Interns were also introduced to each other and their academic supervisors. Academic supervisors then took their interns, described to them their projects in detail, and their expectations. These activities clearly align with characteristic 1, an introduction to the set the stage. In fact, staff members introduced the interns to their activities on a number of levels, i.e., an introduction to the internship program, an introduction to the workplace, and an introduction to their particular projects.

Academic supervisors explained the goals of the projects (i.e., characteristic 2, a guiding task) to the interns. It was also important to adhere to design principle 1 and set learning-appropriate goals. In general, there were two types of projects that interns undertook. The first type is implementation-based in which interns were to produce a piece of software, information system, or a series of video casts (vodcasts) and the second is investigation-based in which interns investigated loosely defined and general topics and identified specific potential research that can be carried out in those areas.

Implementation-based projects had learning-appropriate goals that were clear as interns could connect with project tasks as they required the interns to put into practice and extend the skills they have acquired throughout their undergraduate studies thus far. The investigation-based projects had learning goals that were less clear. In this type of project, especially as it is loosely defined, interns were not always able to construct appropriate knowledge from the task. Instead, interns focused on simply carrying out the task and found it difficult to realize the overall direction of the project. The end products of investigation-

based projects were report documentations. Thus, all projects resulted in the creation of one or more sharable artifacts (characteristic 3).

In order to complete the projects successfully, interns were supported with the provision of resources (characteristic 4). These included basic necessities, such as computers to carry out the work on, access to their supervisors (i.e., subject-matter experts), access to appropriate software and the Internet. Furthermore, a scaffolding approach was used by the academic supervisors to support the interns and allow them to assess their progress (characteristic 5). These were in the form of training sessions, regular meetings with academic supervisors, and two progress review interviews. These scaffolds supported the interns, i.e., learners (design principle 2), and provided frequent opportunities for revision and self-assessment (design principle 3). In this particular case, it was unnecessary to support the academic supervisors, i.e., instructors (design principle 2), as they are experienced supervisors and regularly use a metacognitive approach to ensure their students partake in cooperative learning rather than simple group work (Cheong, 2010).

Interns were able to collaborate on a number of levels (characteristic 6). Firstly, the interns collaborated with their respective academic supervisors to ensure that the projects were progressing appropriately. Secondly, interns were encouraged to informally collaborate with each other, which they did. These collaborations were in the shape of informal discussions, reviews, and comments. This social structure provided interns support from their academic supervisors and also from each other (design principle 4).

Throughout the internship, interns were to keep a reflective blog (based on guiding questions that were provided) and at the end of the internship, interns presented their projects to academic staff members within the school (characteristic 7).

Social Support by Use of an SNS

Although there are a number of different SNSs, many of them, such as Facebook, LinkedIn, and MySpace, are open to the general public. These sites are already hosted on a server and a member of the general public is able to participate by simply registering and creating an account. For the internship, we wanted to use

a closed SNS hosted on our own server. This would ensure that the material developed by the university remained within the university during the development. More importantly, it would provide the interns a safe and secure online environment to express themselves. Elgg^{iv} is the SNS we decided to use to achieve this.

Elgg is a closed social networking platform that can be hosted on one's own server (as opposed to using other SNSs which are already hosted). Elgg is open-source and we downloaded, installed, and configured it for the purposes of the internship.

The internship used Elgg as a social and communication tool. The internship coordinator communicated general internship matters (i.e., non-project specific), such as reminders and announcements, to the interns through Elgg. In all project teams, academic supervisors used face-to-face interactions with the interns supplemented with "traditional" electronic communication media, such as emails and Skype. In four of the seven project teams, the academic supervisors also used Elgg to communicate and interact with the interns.

All interns were provided with an Elgg manual that was specifically created for the internship. The manual presented them with instructions on how to setup their profiles, and how to use the different tools featured in Elgg. Interns whose supervisors also used Elgg to communicate and coordinate their project were instructed to log on to Elgg when they started work and to log out when they left for the day. This obviously created a strong SNS presence for these interns. Other interns were free to use Elgg as they wished.

4. METHODOLOGY

A qualitative exploratory method, which involved face-to-face interviews, was used due to the limited number of potential candidates available for the study. Participants were recruited based on a voluntary basis.

As the potential candidates were in power relationships (e.g., teacher-student, colleague-colleague) with the researchers, to avoid introducing bias in the data collected, a suitable independent third-party recruited participants and conducted the interviews. The independent third-party interviewer de-identified the data before delivering it to the researchers for analysis^v.

The interviews collected data about the internship and the use of Elgg from both interns (i.e., students) and academic supervisors. In particular, four interns and three academic supervisors were interviewed. Two of the interns interviewed were involved in projects in which the supervisors used Elgg to communicate and coordinate the project. None of the supervisors interviewed coordinated their projects using Elgg.

A summary of the participants is shown in Table 1.

Participant ID	Used SNS to Manage Project?
INT01	No
INT02	No
INT03	Yes
INT04	Yes
SUP01	No
SUP02	No
SUP03	No

Intern participants were assigned participant IDs with an "INT" prefix whilst participants who were academic supervisors were assigned participant IDs with a prefix of "SUP". The numbers following the prefixes have no meaningful bearing.

A qualitative analysis of the data collected is presented in the following section.

5. DISCUSSION

The data collected was analyzed in three different categories. The first two analyzed the interns' (i.e., students') and the academic supervisors' perception of the internship whilst the third analyzed interns' perception of the usefulness of the SNS in the internship.

Student Perspective on the Internship

All interns stated that the internship was a positive experience in which they learnt new things or applied existing skills. From casual observation, there was a strong social element to the internship. Interns became very familiar and at ease with each other. In terms of improvement, interns wanted more collaboration. INT02 suggested having larger projects with teams of interns rather than a single intern working on a small project.

All interns communicated with their supervisors using face-to-face communication primarily, which they all perceived as being the most effective method of communication. Traditional

electronic communication media such as emails, Skype, and telephone calls were also used. INT03 and INT04 also used the Elgg SNS for communication. INT04 found this method to be useful, as supervisors and interns were always in front of their computers and could quickly communicate through Elgg without physically moving to each other's office for face-to-face communication. As expected, INT03 and INT04 used Elgg very frequently whilst INT01 and INT02 used it occasionally. INT01 and INT02 primarily used Elgg to "see what other people were up to, sending quick messages to other interns and supervisors, and the events calendar".

Academic Supervisor Perspective on the Internship

As with the interns, the academic supervisors also found the internship to be a positive experience. SUP01 found the internship to be "a great idea because it provides me with some good service for a project that I want to do which is a self-interest and it also provided opportunities for students to extend themselves, which I think is a fantastic thing to do." SUP02 notes that "the experience was a very good one, socially and in terms of the project: the project work was quite successful within its scope." SUP03 also comments on the strong social aspect of the internship, "I thought that the presence of the students really added to the life of the floor. And I think that the staff actually enjoyed the fact that they were here."

The academic supervisors did not find any major areas of the internship for improvement. SUP01 suggested, "there is always the possibility of involving more students, perhaps a greater range of projects from more staff. But I think that was the first run through and it was really good." SUP02 thought the internship coordinator's leadership "had just the right amount of documentation without being over prescriptive" whilst SUP03 acknowledged that the internship could be improved by including more projects from more staff members.

All three supervisors noted that the most difficult part of the internship was finding time to meet with their interns, mainly due to their existing workload (the internship supervision was a voluntary task). Supervisors were unable to spend as much time as they would have liked with their interns and projects.

Academic supervisors found the social aspect of the internship to be a key part of it. SUP02 notes that it is particularly useful for interns who have limited social skills as it provides "a safe environment for them to share ideas." SUP01 observed that as interns, the students were "temporary staff members" and that "modified the gap between the staff and students because they are working in the same staff area." SUP01 specifically notes that putting the interns in an area by themselves and away from the academic staff "would have been a very bad thing." SUP03 comments that the "social aspects were the highlights of the whole thing".

In regard to the teaching and learning involved in the internship, all supervisors felt strongly that all interns did "grow intellectually" and that they "honed their skills." SUP03 also noticed that there was an increase in the interns' sense of confidence and SUP01 thought it positive that interns were recruited from all year levels, including first year students, "I think it was good getting people coming out from first year because that gave relatively junior undergraduates a real chance to extend themselves and I think that's often not given to them at that stage of their undergraduate career."

Supervisors did not see themselves as traditional teachers during the internship. SUP01 states, "it was really collaborative. I am not sure I acted like a teacher, rather like colleague. Really, we both were solving problems together." Similarly SUP03 acknowledges that the intern in his project mostly "taught himself".

The academic staff found the internship experience to be very rewarding and all of them strongly supported the continuation of the internship. SUP01 commented, "I really enjoyed this exercise. I hope we can do it often because I found it challenging and I really, really enjoyed it". SUP02 echoes the same sentiment, "Keep doing this!!! The interns were a great boost to the academic environment." SUP03 acknowledges the benefits to all involved, "I think it was a tremendous success, from the students' point of view, the school's point of view, and the staff's point of view".

Use of SNS for added Social Support

Of particular interest in this study was the assessment of the usage of technologies such as an SNS to support the social aspect of the internship. There were mixed feelings about the

use of an SNS to support the social aspect of the internship. Interns did not find it to be particularly useful apart from keeping in touch with other interns and sending quick messages. Similarly, most academic supervisors did not see much value in its use.

SUP02 was the only supervisor who thought online tools might be useful, *"I think online tools would be a help. Why not? This is another mode of communication and students are used to using such tools."* However, SUP02 also points out that these *"should be kept informal, otherwise it starts to become a job."* The other two supervisors did not see much value in the use of online tools for the internship. SUP01 thought face-to-face communication worked well and SUP03 believed that since the interns saw each other daily and were well integrated socially, the use of an SNS would be *"redundant"*. However, SUP03 does note that online tools to use as a reflective journal could be useful, *"The only thing that I could think of is Pebble Pad, allowing students to keep a journal, that might be useful in the future. That is, the student part from just keeping their own notes on what's happening week-to-week, actually has an online resource where they can store their reflection on what they've done."*

6. RECOMMENDATIONS

Based on the experience of the internship and a qualitative analysis of participant responses, we provide a number of recommendations. The recommendations are made on two levels: the overall internship structure and the project design.

Internship Structure

The internship structure that we implemented was found to be appropriate. This involved an academic acting in the role of internship coordinator and other academic staff members as project supervisors. The role of the internship coordinator is to oversee the entire internship, which includes liaising with both interns and supervisors as necessary. The internship coordinator is also responsible for ensuring that there is a social component to the internship and that projects are scoped appropriately to ensure learning and skill development occurs.

Initially, interns should be introduced to each other and members of staff. Furthermore, they need to be oriented around the workplace and provided with appropriate equipment

(e.g., desk, computer, access cards, etc.) to carry out their work. Being assigned a supervisor is of the utmost importance as it provides the interns with a clear reporting hierarchy.

In terms of assessment, midway and final interviews were used and found to be useful. Both sets of interview questions are exactly the same. Thus, at the end of the internship, it is possible for the intern and supervisor to compare the two and determine the intern's growth. The interview questions used in our internship mainly focused on soft skills such as problem solving skills, interpersonal skills, creativity, desire to learn, etc. A reflective blog is also useful for the interns to personally track their own progress and to think about the work they have been carrying out.

A final presentation session was also found to be constructive. Interns should be made aware that they are required to present their final work in such a session in front of fellow interns and academic staff members at the start of their internship. This provides them with motivation throughout the internship. Additionally, this presentation session can serve as a showcase for the interns, promote their work, and inspire other staff members and students to participate in the next internship.

Academic staff members acting as supervisors should be made aware that they will need to spend a significant amount of time with their interns. It is important that they are able to consider this with their workload.

Interns should be located in the same or neighbouring offices if possible. This is important, as close proximity will help them socialize amongst themselves. Furthermore, interns should be co-located with academic staff members and treated as *"temporary"* staff members. That is, they should be treated as typical staff members as much as possible. For example, invited to staff meetings (even if not directly related to their project). This allows the interns to mix with and makes them feel part of the staff body.

When recruiting interns for this type of internship, students from all year levels should be considered, not just those from penultimate or final years. This is beneficial for high achieving students in junior years who are not being challenged enough by the standard program curriculum. Such a case was present in run-

ning of this internship and the student found the internship to be of great value.

Project Design

To ensure appropriate project-based learning occurs during the internship, projects should be specified according to the four design principles (refer to the Project-based Learning section). Learning-appropriate goals can be ensured by the academic supervisor clearly stating what skills and what skill levels are required for a student to complete the project successfully. Once an intern is assigned to the project, the supervisor should reassess the project in view of the intern's skills.

The supervisor should build scaffolds to support the intern. For example, the supervisor may initially direct the intern to appropriate tutorials and references so that he or she can learn required material before being challenged to the main task of the project.

Frequent opportunities for formative assessment and revision can occur during regular (e.g., weekly) meetings between supervisors and interns. In the meetings, supervisors should review the interns' work for the week, critique it, and provide feedback and possible future directions.

Promoting participation can be done at the internship level rather than project level. The internship coordinator can organize a few social events (e.g., morning teas, lunches, etc.) to ensure social bonding between interns. Additionally, formally introducing interns to members of staff will also assist integrating them into the social organization.

Project supervisors should also consider the possibility of interns working in groups on larger projects. If interns are working in groups, the supervisory approach is particularly important. A metacognitive approach to supervision has been shown to elevate typical group-based learning to project-based group supervision (Cheong, 2010). This approach can be used to further improve the interns' experience.

7. CONCLUSION

We analyzed an approach using a project-based learning internship for undergraduate IT students with social support using an SNS. The approach used in the internship itself was found to be very useful and enjoyable by both the interns involved and the academic supervisors. The most important part of the intern-

ship is to ensure social integration between interns and members of staff.

Interns should be treated as "temporary staff" so they feel as part of the workplace. They should be invited to staff-related events, such as meetings. Appropriate intern inductions and performance assessments such as midway and final interviews were also found to be beneficial. Recommendations for internship structure and project design are specified in the Recommendations section.

The use of an SNS to support the social aspect of the internship online was not perceived to provide additional benefits. This is most likely due to the environment of the internship. That is, interns interacted with each other on a daily basis and were in close proximity during most of the internship. Thus, the SNS did not provide anything additional.

A limitation of the work is that the number of interns and supervisors were quite small and, furthermore, not all of them volunteered to participate in the study. Thus, more extensive trials will be required in order to confirm the preliminary findings presented in this paper.

As part of future work, a longer version of the internship in which the interns are not in close proximity of each other (both in terms of geographical space and time) could be trialed to determine if the SNS has a positive effect. This may help to determine the interns' preference of SNS-based communication over face-to-face communication and in what circumstances they would choose one over the other.

Additionally, a comparative study between this type of internship, i.e., an "internal internship" managed by academic supervisors, and traditional internships, i.e., students working in an external corporation, may provide another direction for future work.

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ⁱ <http://www.facebook.com>

ⁱⁱ <http://www.linkedin.com>

ⁱⁱⁱ <http://www.myspace.com>

^{iv} <http://www.elgg.org>

^v The research was conducted with ethics approval from the RMIT Business College Human Ethics Advisory Network under register number 1000121.