MEAD
MANAGING EDUCATION WITH TEACHERS AT A DISTANCE

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Abstract – *The MEAD project is aimed at the challenge of getting competent teachers in a rapidly changing area such as computer science which for many institutions is a non-trivial task. Involving teachers at remote institutions might be a solution to this problem. There are, however, many obstacles with doing so, and this paper looks into the teacher aspect of being involved from a remote place in a course, as well as to present the Open Ended Group Project (OEGP) as a suitable education format for such a situation.*

The first step in this project has been to investigate properties of OEGPs and to see if the concept will fit with the intention of the MEAD project. Some general aspects of OEGPs that are deemed especially promising are presented, many of them based on Runestone which is an OEGP where experience of involving non-local teachers has been gained. The IT project semester is an instance of a course that is run with a non-local teacher. Planning and initial observations from this course are presented.

Index Terms - Computer science education, non-local teachers, teaching methods

MOTIVATION AND OVERVIEW OF THE PAPER

The area of Computer Science (CS) is past the stage where it could be seen as a trendy blip, like the comparison by a Swedish minister between the Internet and a summer fly, but this doesn't mean that CS departments are in a steady state situation. Technical development is still undergoing extreme change and there is consequently rapid expansion in the knowledge field. There is also a strong trend towards integrating CS with other fields of expertise. This leads to the danger of running into situations where a CS department simply doesn't have the required competence for some of the courses, or parts of the courses, taken by the students. The MEAD project is a step towards establishing functioning strategies to involve non-local teachers in such courses in order to provide additional expertise which is missing at the local level.

Initial discussions and negative past experiences with defining and sharing course modules on an inter-institution level led to a decision to investigate Open Ended Group Projects, OEGP [5, 9], as a base for involving non-local teachers in local courses. The Runestone project [3], see the web site www.docs.uu.se/docs/runestone/ for more information, is a well functioning example of an OEGP where non-local teachers are involved in a course. However, in this case there is also a local teacher at each institution, and both teachers have the same role, i.e. supervising and evaluating a set of teams. Half of the teams will thus have a non-local teacher for the most part of the course. The contact consists of weekly chats, or "net meetings", meetings and e-mails. The Runestone project has been, and still is, studied from several aspects. However, the intention with MEAD is to move into a situation where except for the non-local teacher, total local course control is in the hands of the hosting institution. This is unlike Runestone, which is a joint venture between two institutions, i.e. Uppsala University and Grand Valley State University, Michigan, USA. The focus in MEAD is on the IT project semester, a course run in the second half of the fourth year for IT engineering students at Uppsala.

This paper presents some aspects of OEGPs that have been identified as positive and especially so in the light of finding an educational environment where a non-local teacher can function at a reasonable cost in terms of time, money, and resources. The setup of the IT project semester is described and feed-back from the teacher and students half-way through the semester is given.

OPEN ENDED GROUP PROJECT (OEGP)

An Open Ended Group Project (OEGP) is, in short, throwing the students in at the deep end. The students are placed in a situation where they, as a "team", are faced with a task which has no "right" way to tackle it, or rather, there are several "right" ways to solve the task. The task should be "challenging" in order to avoid jumping to "standard" solutions and teachers make it clear that it has to be a team effort to solve it. A fundamental aim in OEGPs is to encourage creative thinking and offer a setting for developing "soft" people oriented skills. However, different aspects and approaches to the development of software can be adopted depending on the type of project. Likewise, there are several ways to set up an OEGP, some of which are described in [5, 9].

Flexibility

Flexibility is almost by nature a necessity if collaboration with a non-local teacher is going to be efficient. Flexibility and course syllabus are, however, often "contradictory"

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terms. There is, for good reasons, an inherent inertia in any course syllabus due to administrative routines. The upside is that changes are, at least potentially, made carefully and with long term goals of the educational needs of the students in sight and that in itself creates a stability in planning. The downside is that the flexibility of including advances in the area, e.g. new methods or ideas, is restricted. OEGPs are an excellent solution to the problems of keeping stability and long term goals intact and at the same time allowing flexibility to incorporate "hot" topics in a way that isn't just a stand alone, and to the rest of the course an almost redundant, module. This is because new topics can be involved in the OEPG each year and modified as required without having to change the structure of a course, or a module on a course.

It is the "open endedness" that is the key, the "hot" topic would be used as component to solve the overall task, thus fitting naturally into the context of the course. This will also offer the opportunity to discuss the suitability of making this particular choice as opposed to using another tool/language/method or whatever the "hot" topic is. There would usually be several solutions but none of which are particularly 'obvious'. The OEGP can act as a small mutable component within a fixed course without destabilizing what is already a sound product from a teaching and learning perspective. The advantage of using the OEGP for new ideas is that they can indeed be tried out in an almost experimental way and then merged with the course should those ideas prove to be fruitful and long lasting [4, 6] without taking the risk with the overall structure of a successful course nor of putting a course into a permanent state of flux.

Another aspect of flexibility is the ability to change the focus of the project and yet keep the overall educational goals of the course. This has as a nice side-effect that tutors can stop worrying about plagiarism, cases of which in an OEGP are extremely low anyway due to the large space of possible solutions. The relevance of the OEGP can thus remain fresh, ensuring that tutors don't become stale and showing students and potential employers that graduates have indeed come into contact with the latest ideas.

Flexibility can also mean that the students in the course can have different backgrounds, or rather that different student groups following different courses can collaborate in a single OEGP. This creates a much more realistic environment for students and prepares them for dealing with several different types of expertise. An earlier instance of the IT project semester involved students taking different degree programmes [4]. A similar diversity of students was brought together for the development of an IT Help Desk Support System at Loughborough [8]. Many of the students undertaking this project commented on the advantages of having teams containing students with different backgrounds since learning how to communicate with different types of 'experts' is something that students need to practice.

Motivation

Motivation is perhaps even more important than usual in a setting with a non-local teacher since there are problems to overcome and well motivated students and staff can make the difficulties easy to deal with. There are many different ways to be motivated, and love of learning for learning's sake, as described by Beckett [2] is among the better. Studying to get a good grade is another motivation that many teachers seem to believe in as the only way to motivate students. Mueller and Dweck [7] and Archer [1] have classified these motivational characteristics in similar ways. They suggest that learning or mastering something is in one category, modifying performance in relation to external measures, e.g. grades, is another, and not being motivated at all is a third.

The set-up with a non-local teacher may make it harder to create a situation where students motivated by getting a good grade will do well. In any event, this is not a desired form of motivation, and studies in Runestone, published [10] and yet not published, show that the OEGP setting motivates the students without the need for a grade incentive. In fact, students who are motivated by the desire to get good grades can easily become disillusioned if there are set backs. However, students who are learning because they enjoy learning are less at risk if things do not go well for them [7, 1]. Similar observations have been made at both South Bank and Loughborough. Students have worked harder than they usually would because they didn't want to let the others in the group down [6, 9]. Students will often work harder in a group so as not to let their team members down and this can act as a catalyst for the less energetic and under motivated members of the team so that enthusiasm and the desire to solve the problems of a project can encourage the team to work harder and even more enthusiastically. Frequently the project and its goal become more important to the students than the grades they started chasing at the start of the project.

Collaboration

Collaboration between the students is essential in a setting with a non-local teacher. The teacher might be outside Sweden, thus creating a need for international and inter-cultural collaboration. Skill at collaboration, and especially on an international scale, is something industry has requested. A more academically sound reason for collaboration, especially international, is to be inspired by different ways of thinking, which is likely to increase the motivation to do well in the course. This is, however, easier said than done, since (international) collaboration is likely to present students with difficulties when they attempt to carry it out. Using an OEGP is a convenient way to deal with all the unforeseen problems that are likely to occur in (international) collaboration, since part of the OEGP ethos is to encounter and deal with new ideas. In fact, the OEGP

stresses the search for solutions rather than the idea of gaining marks.

THE IT PROJECT SEMESTER

The IT project semester at Uppsala can be seen as a capstone course, where the master-level students are expected to use previously acquired knowledge and skills, as well as using new ones. The students are grouped into five different and relatively self-contained sub-groups working with the overall goal of performing well at RoboCup, the world championships for soccer playing robots. Some experiences from an earlier version of this project can be found in [4].

This year, spring semester 2003, there are 40 students taking the course. There are also 20 bachelor-level students from a nearby college that collaborate with our students, but in a local course at their institution. Look at www.robocup.it.uu.se or www.docs.uu.se/robocup/ for more information.

This course is run by a teacher who is stationed at the same college as the 20 bachelor-level students. The staffing of this course includes one local teacher functioning as a general support person and one Ph.D. student who has the role of overall project leader. There is also a hardware support person identified. The hardware and the general support persons are supposed to play a passive role, i.e. be of help when asked, as opposed to the overall project leader, who imposes a project management style and ensures that documentation is being handed in on time.

Teacher Perspective

The present teacher of this course is non-local, and the set-up for communication is that he spends one day almost every week in Uppsala meeting with the five sub-groups, and is accessible via mail and telephone on the other days.

The experiences so far in the course, as seen from the teacher perspective, are both positive and negative. The collaboration between the two student groups hasn't worked well. This is assumed to be caused by the students being too different in their levels of competence, and also partly due to uneven sizes within the sub-group structures. The communication between the teacher and the students at Uppsala has functioned well and the students are making good progress.

The OEGP form is considered as almost a necessity in order for the IT project semester course to function. It is considered more important than the local support staff assigned to the project. This is not to imply that they are not of importance for a smooth running of the course, but they are not seen as essential for conducting the project.

The time spent on this project roughly equates that of running two normal courses, and the cost of a teacher giving two normal courses is also similar to what it costs to hire his service. These students would otherwise take between four and six normal courses during the semester.

Student Perspective

A subset of the students have been interviewed in order to poll their experiences with the project and especially the aspect of having a non-local teacher.

The use of a non-local teacher was seen to have functioned well, since much of the work is supposed to happen on student initiative. One student actually stated it was good that the teacher was non-local, since it led to a greater need to step forward and take responsibility.

The format for contact, i.e. physical meetings one day a week and email and phone otherwise, was considered enough at the present stage, i.e. half-way though. At the start of the project most saw the model for contact as a limiting factor, with many issues that could have been solved with a quick meeting taking quite a while to sort out. The students envisioned other phases of the project when once a week meetings would be too infrequent and also saw it as a problem with the non-localness of the teacher when issues that require a face to face meeting occur. There were also comments on the teacher having a lower level of insight into what the students did as a result of being non-local.

The local support persons were mentioned as being of high importance, maybe especially in the role of diminishing frustration. They were not seen as a replacement for the non-local teacher.

Most of the comments were positive and the fact that the teacher was non-local didn't seem to cause any real problems. Some students did identify the type of course, i.e. OEGP, as being the reason for the course to work, e.g. "to have a non-local teacher work because it is a course like this".

CONCLUSIONS AND FURTHER RESEARCH

Initial studies of different examples of OEGPs have indicated that the form is well suited as an education form and also in the case of collaborating with a non-local teacher. The IT project semester was deliberately planned to be run with a non-local teacher using the OEGP format since it was believed the structure provided by the OEPG would allow for flexibility in the way in which the non-local teacher could be involved. An investigation halfway through shows promising results, both from the teacher and student point of view. The OEGP format could be used with the same pedagogic and economic benefits with a local teacher, but the interesting aspect in the MEAD project is that it can be efficiently used with a non-local teacher. Much of the success of being able to collaborate with a non-local teacher is perhaps down to the more fluid and exploratory structure provided by the OEGP since the non-local teacher doesn't have to fit into a rigid and inflexible course structure. It is not necessary for them to understand how other modules fit into the structure either. They can contribute to the OEGP in their own way and that contribution is almost bound to be a new experience for the students because of the non-local teacher's different background. However, because the OEGP

seeks to provide these new experiences there is no need for further integration into the course structure. Other approaches could well leave students feeling as if the experience of a non-local teacher was something outside of the rest of the course.

Finally, another advantage of pursuing this approach is that non-local teachers can be chosen especially for their expertise. As the “hot” topic changes so can the staff who are employed at remote institutions change.

This year’s course will be evaluated using the Q-Val model [11]. The intention is to obtain sound results, including evaluations of teaching- and learning aspects that can be used as a base for forming transferable and general guidelines for using OEGP in settings with non-local teachers in the future.

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