

## An Experiment with Using Google Tools for Project Supervision at Tertiary Education

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**Abstract:** *Problem oriented project pedagogy is an alternative educational approach which often provides a strong natural motivation for the students' work. On the other hand, it requires certain coordination and cooperation skills in communication inside the project group as well as between the group and its supervisor. We study the use of content and coordination management tools for the support of group work. An experiment using a combination of Google Groups/Docs/Calendar services was carried out at Aalborg University in Denmark and we report here on the outcomes of the trial.*

**Key words:** *group supervision, problem based learning, tools for content/coordination management*

### INTRODUCTION

Problem oriented project based learning has had a long tradition at Aalborg University since its foundation in 1974. It can be characterized as a learning process powered by the students themselves. It is typically carried out in small-size groups of two to six students. The group supervisor is in principle unable to steer the students' work and acts mainly as a guide during the learning process.

We investigate the use of tool support for content and coordination management in project supervision in order to improve the learning process and to optimize the load of organizational tasks both from the students' as well as supervisor's perspective. Our tool selection criteria are that the technology must be inexpensive, easy to use, run on most of the wide-spread platforms and provide a support for collaborative and coordination tasks as well as for effective document storage and handling. Wiki pages appear to be a suitable technology to fulfil many of these requirements (for a general introduction to wiki-based learning see e.g. [6] and [8]). Citing [1]: "Wikis are socially oriented, software based web pages that enable cross platform editing and redistribution of original content." Wiki pages are easy to create and use without any prior experience and background in web design. However, not all uses of wikis in the learning environment have been successful. The formatting capabilities are often limited and the motivation of the students to use them may be difficult to achieve. For example Choy and Ng [2] suggest that the use of collaborative nature of wiki pages is problematic in certain scenarios.

There are many commercial as well as open source software packages that implement wiki pages. For several reasons that are discussed later on, we chose to focus on Google Groups and other related technology. *Google Groups* is a service from Google that supports discussion groups based on common interests. Among others, it allows the creation and editing wiki pages, supports commenting, discussions, uploading of documents and email notification of the changes. Groups can be created and used free of charge and can be set up as anonymous with a restricted set of users. This service is integrated with *Google Docs*, which is a free word processor, spreadsheet and presentation service with online data storage. The tool runs embedded in the standard web browser without the need of any special installation and it adopts a variety of formats like ODF, HTML, PDF, RTF, Word and others. Finally, *Google Calendar* is a free time-management and planning web application. It allows for the creation of multiple calendars, their sharing with different level of access control (read and write, read-only, read-only with

busy display etc.) as well as a synchronization with the most popular calendar clients across many different platforms ranging from desktop computers to mobile devices.

We carried out an experiment that concerned the employment of Google tools in the project management of one group working on their master thesis. The trial group was presented with the available tool support by their supervisor at the first meeting of the semester. As the lack of motivation from the students to use wikis seems to be the main problem in educational activities [3], attention has been paid to a smooth project start. The supervisor prepared drafts of a few wiki pages that were considered relevant for the project work and explained the students the possible use of them. Apart from the wiki pages available in Google Groups, the supervisor gave the group members rights to view his Google Calendar in a read-only mode with the possibility to hide private appointments that are displayed as "busy".

After the end of the semester, the trial group was interviewed and asked to fill in a questionnaire in order to evaluate the experiment. Most of the effort put into the maintenance of the material at Google Groups proved useful and positively evaluated by the students. There are a few necessary adjustments but overall the students plan to use the system also in their future project work. This is a positive sign as it is a purely optional activity and not a part of the final project evaluation. In particular, the use of Google Calendar for meeting planning was highly appreciated.

### **RELATED WORK**

A survey of technologies for the support of virtual project based learning was written by Tolsby et. al. [11]. In their work they evaluate different technologies based on the following attributes: (i) negotiation of meaning (ii) coordination and (iii) resource management. They present several tools like Virtual-U, Lotus Learningspace and Lotus Quickplace and conclude that project based learning may benefit from the facilities of all these systems, however, none of them fulfils all needs of a virtual project. For the purpose of the present article the points (ii) and (iii) are the most relevant ones as the main difference is that our trial group participated in frequent face-to-face meetings and thus several stages during the negotiation of meaning were better handled in the traditional ways. This also means that our demands on the tool support for project management were lower.

Most of the experimental uses of wikis at tertiary education are focused on the classroom environment, as evidenced e.g. in [3] and [10]. For the project management use, we are interested in, Elgort et. al. [4] employ wikis as a platform for supporting assessed project work in groups. They exhibit two experiments but in both the randomness of group formation and the assessment criteria, based on the students' involvement in the process of creation and editing of the pages, established quite different learning environment compared to the typical group projects at Aalborg University. In our setting the students form the groups according to their preferences of cooperation and the choice of topic. Moreover, the group work throughout the semester is not part of the final assessment and does not contribute to the grade in any way. Cubric in [3] writes that 54% of their students would not contribute to the wikis at all if this was not linked to their evaluation. In our setting of group work, the motivation of the students to use Google tools is different and based mainly on the fact that they regard them as an efficiency improvement in their project management.

Another approach is the creation of one-purpose tools to support problem based learning as reported by Yukawa et. al [12]. On one side this allows targeting of even very specific demands in a concrete educational setting, on the other hand it is an approach that is not feasible for most of the practitioners as it is highly time demanding and requires a set of specialized programming skills. Several recent studies like [3] and [10] emphasize also the need to educate the students in how wikis should be used in their work. For this purpose some initial Google Group pages for the minutes from the meetings, literature

overview, open problems, installation guides etc. were set up a priori by the supervisor and some initial content was entered in order to show the students the potential use.

For the coordination management the wiki pages were mainly used to support the meeting agenda and note-taking service to document the topics covered during the meetings with the supervisor (the so-called minutes from the meetings). This kind of use has already been established as a common way to employ wikis in education [7], providing a low-cost but effective communication and collaboration support. The main activities of our students during the semester were the creation of new pages, editing of existing pages, posting comments and using the built-in email notification feature. This seems to be in accordance with the recent findings of Ruth and Houghton [10] where the same four elements were identified as most consistently used by the students (with the small alternation of replacing email notifications with shoutboxes).

Finally, let us remark that we did not investigate in the present study any alternative technologies like micro-blogging (see e.g. [5] where the use of Twitter for educational purposes is studied). This is one of the possible directions for our future research.

### **EXPERIMENTAL SETUP**

The trial group consisted of three computer science students working on their master thesis dealing with the verification of embedded systems and in particular of Petri nets extended with time features. The group continued in the development of an open source tool TAPAAL ([www.tapaal.net](http://www.tapaal.net)). The experiment was carried out from September 2009 to January 2010. One of the students was in his last year of study, the other two group members were in their 4th year. The group has been quite experienced and trained for several semesters in group work (the students here are exposed to group work since the first semester they enter the university). The students were routinely working with file management system based on svn repositories before. One of the students was using a similar project management system in the past, though it was lacking some of the features like email notification of changes and it was used only irregularly. The students compile their final report using LaTeX, hence their use of Google Docs was marginal. Supervisor set up a google Group and created initial wiki pages for

- minutes from the meetings (summary of the meetings, tasks for next meeting, etc.),
- reading summary (uploaded some initial literature as PDF files listed on a page),
- list of problems (selection of possible future directions, open problems, etc.),
- Eclipse setup (a guide how to check out TAPAAL in Eclipse environment), and

made his Google calendar available to the group members. The time estimated for this start up was about two hours. The system was presented to the students at the first meeting and the presentation took about 30 minutes. The supervisor then filled in the minutes from the first meeting, an activity that was later overtaken by the students.

The students set up their accounts, learned how to use Google Calendar for arranging meetings with the supervisor and later on maintained the initial pages as well as created new wiki pages and discussions. This included pages for project planning, list of results and definitions and ideas for alternative research directions.

### **EVALUATION**

The experiment was evaluated by interviewing the trial group and by a questionnaire. The students were also asked to give written comments on their use of Google tools during the semester. The table below summarizes the quantitative data related to the evaluation of the usefulness of the respective pages both by the group as well as the supervisor. The marks are given on the scale from -3 to +3 with 0 representing a neutral opinion, -3 representing a strongly negative evaluation and +3 a strongly positive one.

Wiki Pages (* ... supervisor initiated pages)	Frequency of use	Students	Supervisor
Minutes from the meetings*	Weekly	+1	+3
Reading summary*	Daily (at the start)	+2	+2
Project planning	Monthly	+2	+1
List of problems/challenges*	Weekly/Monthly	+2	+2
Project start (Eclipse setup)*	One time	+2	+3
Definitions/Results	Seldom	-1	-1
Alternative research directions	Seldom	-3	+2
<b>Calendar based activities</b>			
Planning of meetings with the supervisor*	Weekly	+3	+3
Planning of internal group meetings	Never	0	0

### Students' Perspective

The group found it easy to get started with Google tools. The members of the group were computer science students, which made it even easier. Citing the students:

*“Very straightforward to get started and use the system. We all used Gmail, so it was quite natural to use the other google features, like calendar and groups.”*

The group evaluation was mostly positive, with the exception of two wiki pages that the students initiated on their own. Early in the semester, the trial group was reading many scientific papers and started a wiki page where they gathered the main definitions and results together with appropriate references. Because wiki pages are edited in a simple browser-embedded HTML editor, typesetting more complex mathematical formulae is difficult. As the group was using LaTeX for writing their report, they found this as a redundant work because the text in wiki pages could not be directly reused in their report. This may be different for a group writing their report in Word, as Google Docs provides a support for this format and the data entered to wikis can be then directly reused. The group also took the initiative to make a wiki page where they outlined and discussed possible research directions in their thesis work. Their negative evaluation on this page is given by the fact that they later on did not use these ideas in the report. Otherwise, the other pages were relatively frequently used and the students highlight the fact that the supervisor has a direct access to the minutes from the meetings and the project planning page, as this creates an implicit and informal agreement between the group and the supervisor about what happened during the meetings and what decisions were made. In case of disagreement, the supervisor can post remarks to the wiki page and/or initiate a discussion on the points that were misunderstood during the meeting. Among the different tools, Google calendar was the most appreciated by the students. Citing:

*“Especially, Google Calendar is recommendable. By far the easiest way to manage meetings with supervisor.”*

Encouraging is the fact that the students will continue to use the system also in the forthcoming semester and recommend its use to other groups too. Let us recall again that the use of such a system is not in any way related to their project assessment.

### Supervisor's Perspective

The setup of the system takes a few extra hours of supervisor's time, but the system is easy to use and problem-free. For the next time it is expected that the overhead at the project start will be minimal. The system provided several improvements compared to the

traditional way. From the pedagogical point of view the main advantage is that the supervisor has an overview of what is happening in the project work of the group and what kind of activities they are working on. It makes it easier to anticipate possible misunderstandings in early phases of the project and helps the group to set up explicitly formulated short-term goals on a weekly basis. This can be useful especially for groups of weaker students that have a problem to achieve a sufficient progress in their project. The supervisor did not find the wiki pages about alternative research directions useless, as they outlined a possible continuation of the project and it helped the supervisor to have a better overview in which direction the project may diverge. Also the use of a wiki page for the tool installation in Eclipse proved useful as the arising problems were discussed in an associated discussion and were readily accessible to other group members. Perhaps the main saving was in using Google Calendar to arrange meetings that are typically initiated by the students. Previously, the students suggested a possible date and time by email. However, this often conflicted with the supervisor's schedule and had to be renegotiated by email. In Google Calendar the students have an overview of supervisor's activities and suggest meetings at free slots. If the time is suitable, one click will confirm the meeting, place it to the calendar and notify all invited members. Otherwise, the meeting can be easily moved by the supervisor to other slot and it will wait for an approval from the students.

### **CONCLUSION AND FUTURE WORK**

We experimented with tool support for content and coordination management of group supervision in problem oriented project pedagogy. The corner stone of the experiment was in the use of wiki pages and discussions related to the group work, as well as the shared calendar technique for arranging meetings. We chose to use the services Groups, Docs and Calendar provided by Google. The main advantage is that most of the students already have a previous experience in using at least Gmail, the technology is intuitive and easy to set up, there is no need to install any software, and last but not least, it is free.

As the use of wiki-based support in education is reportedly not always successful [2], a careful preparation at the supervisor's side is necessary. In the experiment we achieved a good balance between the motivating factors and the time overhead of the trial group. The process was positively evaluated both by the trial group as well as the supervisor. Some of the material gathered in the wiki repository has a good value and can be considered for a use as a body of information for future groups/classes, as it is suggested for example in [9]. As one of the most important factors that influence the degree of success we mention the role of the supervisor. One can only agree with Cubric [3] who writes: "Students' engagement with wiki-based learning activities is directly proportional to the quality and frequency of tutor's feedback and the clarity of the underlying learning and teaching process." On the other hand, the time spent on this process pays back in a more efficient communication with the group and in total the time spend on the supervision did not exceed any traditional group supervision process with only face-to-face meetings. In some aspects, like the arrangements of meetings using Google Calendar, the time savings were considerable compared to the standard communication channels.

In the future work we plan to experiment with technologies for group supervision on a larger scale. We also suggest a few improvements based on the lessons learned during the experiment. First, we recommend that all communication between the group and the supervisor takes place via the wiki pages. This will ensure that the pages stay alive. Some of the material that can be potentially included into the final student's report is better stored in the format that makes it easy to reuse during the writing process. In case of a large amount of literature used in the project work, one can consider specialized tools for article management like the system called Mendeley (<http://www.mendeley.com/>).

Finally, let us note that we believe that the suggested methodology may be appropriate not only for problem oriented project pedagogy but can be used in general group supervision too. In this case, the motivating factors of the students and supervisor's engagement become critical elements in the methodology.

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