

# USING AGILE METHODS TO SCAFFOLD TEAM PROJECTS IN AN IT ETHICS COURSE \*

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## ABSTRACT

We describe an effort to revise the scaffolding used for a final group project in a technology ethics course. In past semesters, groups usually produced a good final product, but often with much chaos, drama, and intervention from the instructor. We discuss the use of Agile methods to revise the project scaffold in an effort to improve the group project experience for students and instructors. The application of Agile to a wider range of projects also offers an opportunity for computing educators to share their knowledge of Agile with peers in other fields.

## INTRODUCTION

Team projects present many challenges but can be an effective tool for student learning. Group work requires students “to negotiate meaning with their peers, share ideas, collaborate, and reflect and report on past learning experiences” and students gain practice and preparation for the workforce, which demands collaboration and teamwork skills [1]. Students dread group projects and experience “group hate” for many reasons including grades, interpersonal considerations, poor outcomes of group work, and group organizational issues [14].

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As faculty, we have similar concerns. Individual students may have a good command of the course material but organized into a group these same students may produce poor quality work. The amount of time in the semester and the need to achieve set course learning outcomes constrain the time available for activities that might help the planning and organization of projects.

Agile software development practices have supported significant improvement in software development projects. Key Agile practices focus on communication and transparency, which are some of the key challenges found in student group projects, so we investigated how Agile practices and tools could be used in a student project that did not involve software development.

## **BACKGROUND**

Collaborative learning is an established and recognized pedagogical practice to enhance students' learning at the postsecondary level [2,3,9,10]. The simplest definition is an instructional method where students work in groups to achieve a common academic goal.

Much literature exists on the benefits of collaborative learning, and how it helps students achieve higher grades, learn at a deeper level, retain information longer, remain engaged in their course of study, develop stronger communication and teamwork skills, and gain a better understanding of the workplace environment [9]. A number of studies have investigated ways to improve group work including communication, group size, and use of technology. Positive impacts are found for smaller groups, face-to-face communication, some technology tools, and incorporating instruction about group skills [4,5,6,7].

Clear success in improving group projects has been seen with the use of Agile in software development courses [13] and technical writing courses [11]. The Agile focus on iterative work cycles, frequent communication, and collaboration between the customer (professor) and team allows the team to learn to work together and adapt to the project's changing needs. If we connect efforts to improve teamwork using tools and communication with the success of Agile in software development and technical writing, it is natural to ask if Agile can be adopted for use in a wider range of group projects.

## **DEVELOPING AN AGILE PROJECT SCAFFOLD**

To explore how Agile practices could be used to support a group project in a course, we designed and implemented an Agile-based project scaffold for the final group project in a technology ethics course. Our initial goal was a scaffold that would be similar to the previously used scaffold in terms of the time and effort required from students. Student and instructor feedback would be assessed to inform further use and development of the scaffold. In Agile terms, we wanted to deploy an initial release and gather information for a retrospective and planning for the next release.

For the final project in the course, students spend 4 weeks working in groups to develop a 10 – 15 minute multimedia presentation on a topic chosen by the group. The presentation is expected to explain the topic, identify and discuss ethical issues, and keep the audience's attention.

In applying Agile practices to this project, we faced several challenges. The course learning outcomes do not involve learning about how to do group projects and the course is taught in a hybrid format meeting in person once a week for eighty minutes, so it is hard to justify allocating course time to teaching Agile concepts. The class is required for computer and information technology majors, but also attracts students from other majors since it satisfies requirements in humanities and social sciences. This breadth of students adds much value to the class, but may also limit what technology can be used to support the project. These factors challenge many of the principles behind the Agile Manifesto [12] including the focus on motivated individuals, face-to-face conversation, and self-organizing teams.

To address these constraints, we adopted an approach we call “stealth agile” where students do Agile-based activities focused on promoting reflection, communication, and transparency, but we do not spend any time formally teaching Agile practices. We structured the project as three one-week sprints with a consistent set of assignments each week and identified some changes to the class meeting used to kickoff the project. The hybrid nature of the class set the expectation that students would do significant work outside of the class and use technology tools including the course learning management system (LMS). We built on this by asking students to use Trello, an online tool to support planning, organization, and communication.

The major focus of the project kickoff class meeting was for groups to get organized and develop at least two topic ideas to allow the instructor to interact with the groups and provide immediate feedback about their topics. We added activities to introduce Trello, help groups break the project down into smaller activities, and reviewed the weekly project assignments. As part of the kickoff, each team submitted a report discussing at least two project ideas, suggested criteria for evaluating the final presentations and team participation, and discussed planned team activities for the next week.

Trello is an online collaboration tool to organize and plan work in a visual format, which can mimic an Agile storyboard. The main items in Trello are boards, lists, and cards. A project team using Agile practices might create a Trello board for the project with lists named “to-do,” “doing,” and “done.” Team members create cards for project tasks in the “to-do” list. Other team members can edit cards to add comments, attach files, and add other details. A team member then selects a card from the “to-do” list, takes ownership of the task, and moves it to the “doing” list. When the task is complete, the card is moved to the “done” list. At any time, the Trello board provides a clear visual picture of active tasks and their owners for both students and instructors. As cards flow from “to-do” to “doing” to “done” lists, the number of cards in each list provides a visual view of progress.

We created a Trello board for each team with lists for “to-do,” “doing,” and “done” and populated the “to-do” list with cards for some high-level tasks and initial project

assignments.

Each weekly sprint was structured to begin and end on the day the class met. Twice during the week, students completed individual updates in Trello and at the end of the sprint, each team submitted a group update. The individual updates were adapted from the Agile daily stand up concept by adding a Trello list for each update. The list contained a template card that each student copied and edited to answer three questions:

- What have you completed since the last update?
- What will you work on in the next 2-3 days?
- Are there any challenges or things that are slowing progress?

In the first week of the project teams submitted a planning report with a timeline outlining how the team would work through the research, planning, and development needed to create the final presentation. In the weekly status updates, teams assessed their progress against their project schedule and provided updates on their topic and presentation format. Teams behind schedule were expected to discuss what they were doing to get back on track. The weekly structure was designed so that much of the information needed for the weekly status update would be provided in the two individual updates, so students who did not complete both updates in the week received zero points for the weekly update.

## DEPLOYMENT AND EVALUATION

The Agile-based scaffold was used with a single course section with 23 students who were broken into 5 project teams for the final project. We released the details of the project, including an example presentation, a calendar of the required weekly activities, and a short video showing how to access Trello two weeks before the project kickoff to allow students to explore the project details.

Students were added to their team's Trello board a few days before the project kickoff meeting and received an automated e-mail inviting them to join the team's Trello board. Sixty percent of the students joined their team board before the project kickoff meeting.

Students completed an end of project survey using Likert-scale questions to assess their view of the project scaffold. We also reviewed Trello boards and activity logs to assess the use of the tool and held informal discussions with students to get additional feedback. Of the 23 students in the class, 16 completed the survey for a 70% response rate. The survey questions and response data are shown in Table 1.

Question	SA	A	N	D	SD
1. Using Trello, a visual and virtual storyboard, helped me and my project group to define our tasks, track our work, and complete our project on time.	56%	38%	6%	0%	0%

2. Using Trello helped me and my project group to be accountable for our work since we all could see who was assigned to which tasks and which tasks are being worked on.	38%	63%	0%	0%	0%
3. Using Trello to manage group work was more effective than past group experiences where no system was used.	44%	31%	25%	0%	0%
4. The practice of individual updates in Trello was useful to see what each project team member was working on and if they had any problems keeping them from their work.	44%	31%	0%	19%	0%
5. I feel that the individual updates in Trello helped to increase accountability within my team.	31%	44%	25%	0%	0%
6. Our instructor used the information from the individual updates in Trello to reach out to my team with input or to help address problems.	31%	25%	25%	13%	0%
7. I learned new knowledge from reading my team members individual updates in Trello.	19%	50%	31%	0%	0%
8. Completing weekly project updates helped my project team to understand how we could improve working together as a group.	19%	50%	31%	0%	0%
9. Using Trello (visual storyboard), individual updates and group updates enhanced my group experience compared to other group projects where these items were not used.	38%	44%	19%	0%	0%
10. I will continue to use some of the group project practices I learned in this course in my own life or future classes.	25%	56%	6%	13%	0%

Table 1. Survey responses. Due to rounding totals may not sum to 100%. All questions used a five-point Likert scale ranging from Strongly Agree to Strongly Disagree.

Overall, students agreed that the tools and activities used in the project scaffold were useful. Some students did not feel that the individual updates were useful. A couple of factors may have contributed to this. Some students did not complete the updates. For the six individual updates during the project, completion ranged between 74% and 91%. Another potential problem is that only the last student to complete an individual update would see all of the other updates. The first student to complete the update would only

see the other updates if they revisited the update later.

It is encouraging that 81% of students will continue to use some of the practices in future projects (question 10). This agrees with a number of individual comments that students shared in discussions with the instructor. Students were especially interested in Trello and clearly explored Trello features that were not introduced as part of the project such as changing their board's background image.

From the instructor's perspective, the use of Trello and the weekly status updates significantly improved insight into each group's ongoing activity. The teams did have problems along the way, but we saw them earlier and had a better idea of how the team members were interacting. The initial setup of the Trello boards and ongoing work to add the Trello lists for the individual updates required minimal effort.

## **REFLECTION AND NEXT STEPS**

From the perspective of both students and instructor, the results of this trial were positive. All of the teams produced acceptable presentations, and more importantly, there were no last-minute concerns that a group would not have a finished project. Teams gladly engaged in the Agile practices, used Trello to support their projects, and clearly agreed that these were an improvement over their previous team projects.

Based on this response, we will continue to use the Agile-based scaffold with some improvements. We plan to extend the project by a week to allow more time for the project kickoff. In the project updates, teams will showcase a specific aspect of the project – research on their topic, research on presentation tools, planning of the presentation and development of the presentation.

In discussions of this work with colleagues from other departments, there has been significant interest in learning more about this project and Agile in general. We are working with our university's center for teaching and learning to respond to this interest.

We are also looking for ways to expand the use of Agile across our curriculum. As part of this, we expect students to develop significant Agile experience. These students could then serve as coaches for the final project in the technology ethics course.

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