Student Group Satisfaction Perceptions using Agile in a Project-Based Course

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Abstract

This study aims to examine the effectiveness and value of using Agile work practices to enhance group satisfaction in project-based courses. This study explores student perceptions of using Agile in a group, project-based course to support how Agile can be utilized in higher education to positively enhance group collaboration and teamwork. Surveys completed by students indicate that students found value in using the Agile mindset and Agile practices in a project-based course. Students ranked MoSCoW prioritization method and storyboards the highest of all the Agile practices.

Keywords: Agile, group work, teamwork, project-based courses

1. INTRODUCTION

This study aims to examine student perceptions of using Agile practices to enhance group work satisfaction in project-based courses. An IS/IT education program at a public university has a project-based introductory Agile course. Students collaborate as groups to complete a project for a client, usually a local non-profit. Students use the Agile way of working and Agile practices to complete the 11-week project. At the end of the project, students answered a 14-question Likert survey regarding their perception of Agile.

When working with student groups in an introductory-level course on Agile, more is unknown than known. Students do not know how they well they will collaborate as a team and they do not know much about the project they are being asked to develop. Student groups can be challenging, even volatile, uncertain, complex, and ambiguous (VUCA). VUCA was coined by the United States military and is currently being used to describe what citizens of the globe face daily, including climate change, societal and political turmoil, and wealth inequity (LeBlanc, 2018). The unknown about student groups and projects can be described as VUCA. Volatile, uncertain, complex, and ambiguous can describe groups and group work. Student groups can be volatile with clashing personalities. They can be uncertain since there is no protocol on how to work as a team or if the team's communication is lacking. Groups can be complex due to the competing priorities of students including jobs, family life, and academics. When a group has no leadership, poor communication, or does not understand the assignment at hand, they can be ambiguous.

However, project-based learning is a staple in many higher education courses and is considered a key component of a student's higher education experience (Frame, Cailor, Gryka, Chen, Kiersma, & Sheppard, 2015). Agile is a possible approach to help students have a positive group experience and increase work quality (Hulshult & Krehbiel, 2019; Woods & Hulshult, 2018; Krehbiel et al., 2017; Pope-Ruark et al., 2011; Rico & Sayani, 2009).

This paper is organized as follows. First, for the context and background, an overview of group work. Second, a brief history of Agile is presented. Third, a brief overview of the course

and project is presented. Fourth, the research process and results are discussed.

2. LITERATURE REVIEW

Group Work

Group work is a common teaching methodology that provides students with intellectual advantages and practical workforce experiences. Group work is an effective learning strategy because it requires students "to negotiate meaning with their peers, share ideas, collaborate, and reflect and report on past learning experiences" (Beccaria et al., 2014, p. 1095). When students collaborate, they learn to manage unscripted situations, work together, and navigate diverse, complex issues (Beccaria, Kek, Huijser, Rose & Kimmins, 2014; Kuh, Kinzie, Buckley, Bridges, & Hayek, 2006). Employers consistently rate teamwork as one of the most important soft skills (CompTia, 2015), so offering group work experiences benefits students in and out of the classroom.

Group work is also both academically and socially beneficial (Beccaria et al., 2014). Students develop a greater sense of group processes and group dynamics, communication and leadership styles, critical thinking, problem-solving and social skills, and they may experience personal growth" (Beccaria et al., 2014, p. 1095). Collaborative learning activities help students gain the ability to resolve problems and conflict, communicate effectively, set goals, manage time and tasks, and observe team dynamics (Beccaria et al., 2014).

While group projects are an effective tool for student learning, they also present challenges (Woods & Hulshult, 2018). Students dislike group projects for multiple reasons including, being in a group where they end up doing all of the work, having to get to know new people who they may not get along with, or having to find time to work as a group. Students have competing priorities such as other classes, jobs, or family responsibilities, which limit the amount of time they have to work on group projects (Woods & Hulshult, 2018).

Faculty have similar concerns about group work in courses. Students may have a solid understanding of the course material, but when organized into groups students may end up arguing and producing poor quality work (Woods & Hulshult, 2018).

Agile

A promising approach to enhance collaboration and group projects is Agile. According to ICAgile, "agile is not a process, methodology, or framework; it is a mindset that welcomes uncertainty, embraces challenges, empowers individuals, and views failure as a learning opportunity. Adopting an agile mindset unleashes the brilliance of people and teams, which enables rapid discovery and faster innovation" (ICAgile, Mission, n.d.).

Krehbiel et al., (2017) state that Agile is a collection of practices aimed at enhancing group collaboration. Agile was developed in the computer software industry in 2001 to manage software development projects. Agile teams focus on collectively articulating their goals, reflecting on their work and making necessary adjustments, having authentic group interactions, improving team dynamics, and encouraging innovation (Smith & Sidky, 2009). The practices built into the Agile process help teams get real-time feedback on their work, reflect on their functioning as team by discussing about what is going well and what needs improved, make adjustments to their work, and repeat. Agile teams have higher quality outcomes and better meet their customers' needs compared to traditional project management models (Krehbiel, et al., 2017).

The Agile way of working and Agile practices is slowly making its way into higher education. There is a small number of faculty researching how Agile can be applied to higher education to improve teaching and learning.

Agile practices provide teams with tools to help them work more collaboratively as a group. These Agile practices help teams to communicate (stand-ups, prioritization, user stories), share ideas (planning, retrospectives), reflect on their work and make improvements (retrospectives), and be accountable (story boards and user stories). Some of these Agile practices are discussed in Survey Results and Discussion. Agile projects also have a cadence that help team members settle into a rhythm of the project work cycle.

Agile Project-Based Course

An IS/IT education department at public university offers a three-course concentration in Agile practices. Successful completion of each course provides students with an ICAgile certification. These ICAgile certifications can help students obtain Agile jobs in the workforce. The first course is an introduction to Agile, the second

course is Agile Product Ownership, and the third is Agile Project Management. The research in this study was conducted in the introduction to Agile course. In this course students earn their ICAgile Certified Professional certification. This course is a prerequisite for the other two courses in the concentration. These courses are taught by ICAgile certified faculty.

In the introductory course, students spend four weeks learning the Agile mindset, Agile practices, and the Agile project lifecycle. The remaining weeks of the course are spent working on a project. Students work in teams of four to five students to develop a solution for a customer in the local community or for a department at the university. The client for the project discussed in this paper is a non-profit organization in the local community who needed market research conducted and analyzed to develop possible fundraising opportunities. As a non-profit, this customer relies on fundraising events throughout the year for revenue. This non-profit approached the university's community engagement office, who put the customer in contact with the IS/IT department. This customer wanted students to propose new fundraising ideas that targeted the 18-25 age group with a budget to host the event. Both sections of the course were divided into three teams per section and each team conducted their own market research and developed a fundraising proposal for the customer. The project was 11-weeks in duration. This course also has a service learning designation since the class works on a project for a client.

The 11-weeks was divided into five two-week iterations mirroring an Agile project. The first week of the project was spent allowing the teams to organize and plan. The teams selected user stories to complete for each two-week iteration. At the end of each iteration, the teams would conduct an Agile showcase for the customer. The showcases were held in-person or virtually based on the customer's schedule. For this project, the customer came to the class three times, and attended virtually two times. After each showcase, teams would conduct an Agile retrospective, and then spend a day planning for the next iteration based on the customer's feedback.

3. RESEARCH METHOD

This study aims to examine student perceptions related to the effectiveness and value of using Agile work practices to enhance group satisfaction in project-based courses. This study focused on two sections of an entry-level ICAgile accredited course. One section had 14 students, and the other section had 10 students. Each section was taught by ICAgile accredited faculty.

At the end of the course, all 24 students were asked to answer a voluntary survey concerning the use of Agile practices in the course. All 14 questions in the survey used a standard five-point Likert scale with a "1" signifying strong disagreement with a given statement and a "5" signifying strong agreement. The questions in the survey were divided into four different sections. The first four questions focused on how Agile influenced their learning, use of time, teamwork, project quality, and overall Agile experience. The next three questions focused on if the class project helped them to apply the Agile practices. The next four questions asked students if the Agile practices of prioritization, estimation, storyboards, and user stories influenced their team's productivity. The last three questions asked if Agile improved their group experience and if they found Agile beneficial. Only 21 of 24 students completed the survey. Two of the 21 students did not complete the back of the survey, and therefore did not answer questions 10-14.

4. SURVEY RESULTS AND DISCUSSION

Question		Overall n=21
Using Agile to complete the projects lead to a more efficient use of our time.	Mean Std. Dev.	4.65 0.93
Using Agile to complete the projects made us work better together as a team.	Mean Std. Dev.	4.65 0.81
Using Agile to complete the projects made the deliverables of higher quality.	Mean Std. Dev.	4.70 0.73
Using Agile to complete the projects allowed us to deliver the project in a timely manner.	Mean Std. Dev.	4.60 0.94

Table 1: Student perception of using Agile in a project-based course.

The data in Table 1 displays the survey's results for questions pertaining to student' perceptions of

how using Agile lead to a more efficient use of time, helped them work better as a team, improved the quality of the deliverables, and helped them complete the deliverables on time. As the data indicates, the questions in Table 1 received the highest scores of the survey, indicating that students perceive using Agile practices in a project-based course helped them to manage their time better, work better as a team, develop deliverables of higher quality, and complete the project on time. The mean of the survey questions in Table 1 show a trend that students believe using Agile helps a team work better together, manage their time, and create higher quality outputs on time.

The next set of survey questions focused on how the specific Agile practices of retrospectives, daily stand-ups, and project charter added value to the project. As displayed in Table 2, Agile retrospectives and daily stand-ups received a higher mean than the project charter. The survey results in Table 2 indicate that students perceive Agile retrospectives and daily stand-ups helped them to work better as a team. This survey data also indicate that students perceive using Agile practices helps them to understand the value Agile brings to a team.

Question		Overall n=21
The projects helped me understand the value of performing retrospectives to improve how my team organized, completed work, and how we worked together as a team.	Mean Std. Dev.	4.50 1.00
The projects helped me understand the value of Agile daily stand-ups.	Mean Std. Dev.	4.45 0.94
The projects helped me understand the value of an Agile project charter.	Mean Std. Dev.	4.25 1.01

Table 2: Student perception of using specific Agile practices in a project-based course.

Agile retrospectives are a reflective practice where students reflect on their work every two weeks during the project. They discuss what is going well, what is not going well, and what needs changed, so they can improve how they work together as a team. Daily stand-ups are an Agile practice where a project team meets daily for 15 minutes to discuss what each team member did yesterday, is working on today, and what obstacles are keeping them from working. Stand-ups help a team to bring elements of transparency and accountability to their daily work. A project charter is a document created at the start of a new project that defines the vision or roadmap for the project.

The data in Table 3 display how students perceive the specific Agile practices of prioritization, estimation, storyboards, and user stories helped their teams to be more productive. The Agile prioritization method is MoSCoW, which uses the designations of Must have (M), Should have (S), Could have (C) and Won't have (W) to organize tasks in order of priority. The most important tasks or requirements (think rubric or a client's requirements) are marked with an M, since they "Must" be completed. After a team completes the MoSCoW method, they have all the work or requirements they for a project prioritized. A team can start with the tasks they marked with an M. The MoSCoW method allows the most important tasks to be completed first, which assists in the most valuable requirements being completed first.

An Agile storyboard is a tool that helps teams visualize and optimize how work gets done on a project. A storyboard can be virtual or physical, such as a whiteboard. A team posts all the requirements (called user stories) for a project on the storyboard so everyone can see the work that needs completed and the priority for each item. Team members assign themselves to the user stories on the storyboard so they can be accountable for their work.

User stories are an Agile practice used to represent the requirements for a project, and they are displayed virtually or physically on a storyboard. Story cards usually contain one or two sentences that describe the requirement, feature, or function for a project (LeanDog, 2012). A good practice is to have only one requirement per story card. This practice helps to divide up the work into manageable and incremental pieces.

According to the survey results, students ranked using the MoSCoW prioritization method and storyboards the highest of all the Agile practices surveyed. Since MoSCoW helps students prioritize tasks or requirements, the students perceived that prioritizing requirements needed for a project increased productivity levels of their

teams. When the most important or valuable work is completed first, the project starts to take shape. In an Agile culture, this is called developing the minimal marketable product. The minimal marketable product contains the necessary requirements to be functionable. In the case of the students who participated in the survey, they were able to deliver an initial proposal for fundraising ideas to their client within a few weeks. Students are also encouraged when they can see the results of their work so soon in the semester.

Question		Overall n=19
Using Agile prioritization helped my team to be more productive.	Mean Std. Dev.	4.45 0.94
Using Agile estimation helped my team to be more productive.	Mean Std. Dev.	4.36 0.83
Using Agile storyboards helped my team to be more productive.	Mean Std. Dev.	4.41 0.79
Using Agile user stories helped my team to be more productive.	Mean Std. Dev.	4.23 0.97

Table 3: Student perception of using Agile practices in a project-based course.

The data in Table 4 reflect students' perceptions of how beneficial they found using Agile in a project-based course. Survey results indicate that students found great value in using Agile. All results in this section were statistically close in score. Students indicated that Agile made project/group work more productive. Students also ranked highly that using Agile made project/group work more enjoyable. These results possibly indicate the need to continue to research using Agile in group work and project-based courses. Students perceived in this research that using Agile improved their group work experiences. Teamwork or class projects can often be challenging for students and faculty, and students ranked that using Agile helped their group to be more productive and made the group experience more enjoyable. Agile should be considered as one option to approach group work and project-based courses.

The last question ranked the highest out of this section of survey questions and indicates that students see the value in using Agile and find it beneficial when working on a project.

Question		Overall n=19
Agile made project/group work more productive than not using Agile.	Mean Std. Dev.	4.58 1.00
Agile made project/group work more enjoyable than not using Agile.	Mean Std. Dev.	4.58 0.87
Overall, using Agile on the projects was a beneficial experience.	Mean Std. Dev.	4.64 0.99

Table 4: Overall student perception of using Agile in a project-based course.

5. CONCLUSION

A limitation in this study was the sample size. Future research could examine these survey questions across all three Agile courses in our Agile concentration to evaluate if student's learning and application of Agile has changed as they grow in their knowledge.

The results of this research are consistent with other research where students felt there was value in using Agile practices in courses and teamwork (Hulshult & Krehbiel, 2019; Woods & Hulshult, 2018; Pope-Ruark, Eichel, Talbott, & Thornton, 2011). Incorporating Agile practices into postsecondary courses should continue to be studied since the results are positive may add value to student's learning experience. Agile is a promising solution to further explore to help facilitate group work and projects in postsecondary courses. Faculty who have experienced difficulties with group projects may want to explore implementing some Agile practices such as user stories, storyboards, and MoSCoW prioritization into their courses.

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