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Hulshult, Andrea R. *Agile Narratives: Faculty Perceptions of Using Agile Concepts and Practices in Postsecondary Courses to Influence Collaboration and Transferable Workforce Skills*

Abstract

The purpose of this narrative study was to examine the experience and perceptions of postsecondary faculty members who practice Agile techniques in their classrooms, specifically for collaborative learning activities. The narratives in this study help increase the understanding of how using Agile in postsecondary courses influences collaborative learning in the classroom, and how Agile influences the development or refinement of transferable soft skills students need for the workplace.

Implications of this research indicated that inclusion of the Agile framework and practices in postsecondary curriculum yields advantages for both students and instructors. First, Agile provides a set of tangible tools through its set of practices that instructors can use to enhance collaborative learning in the classroom. Instructors can teach students Agile practices to help their teams work more efficiently. Second, Agile provides instructors with a reflection tool to help improve their own teaching. Agile retrospectives help instructors to reflect on the progress of their class during the duration of the course instead of waiting for evaluations at the end of the course. This allows instructors to make immediate changes to influence learning outcomes. Agile is known for helping teams to work efficiently, communicate, and produce a higher quality product.

Acknowledgments

But friendship is precious, not only in the shade, but in the sunshine of life, and thanks to a benevolent arrangement the greater part of life is sunshine. —Thomas Jefferson

To my husband and darling daughters—Thank you for supporting my dreams. Thank you for always going on my adventures and encouraging me along the way. Ben, thank you for believing in me, traveling to Wisconsin with me, and for allowing me to be an example for our daughters and girls all over the world. Education is power. A special thank you to my sweet Remy who left me encouraging post-it notes all over my office during this journey. My favorite one is: "Dreams are dreams until they come true." Yes, my love, you can turn your dreams into reality. My sweet Reese, as I watch you face life everyday with epilepsy, you give me the strength and courage to pursue my dreams. Thank you all for our extraordinary life together.

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To all those with epilepsy—Keep fighting, keep living life to the fullest, and keep praying for a cure. You can do anything.

To all first-generation students—I want you to know that I am proud to be a first-generation student. If I can pursue higher education, you can too. You can make your dreams come true.

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Chapter I: Introduction

In a 2016 study by PayScale, employers reported that new college graduates are deficient in both hard and soft skills. The top skill that 44% of employers stated new graduates lacked the most was proficient writing skills (Strauss, 2016). Public speaking skills were next with 39% of employers reporting deficiency, and data analysis skills (such as Excel, Tableau, Python) came in third with 36% or employers reporting deficiency (Strauss, 2016). Among soft skills, 60% of managers reported that new graduates do not have the necessary critical thinking and problem-solving skills their organizations need (Strauss, 2016). Employers also reported that 56% of new graduates do not pay attention to detail, 46% need to polish their communication skills, 44% lack leadership qualities, and 36% reported graduates lack interpersonal and teamwork skills (Strauss, 2016).

According to the Road to Recovery Report (Carnevale, Smith, & Strohl, 2013), five of the top 12 skills employers value most are communicative in nature. These five skills are active listening, speaking, reading comprehension, critical thinking, and writing (Carnevale et al., 2013). Teamwork and social perceptiveness are also highly valued and in demand by employers (Carnevale et al., 2013).

Group work or teamwork provides students with transferable skills such as teamwork, social skills, and problem solving. These transferable skills are the skills employers are looking for. When students work in teams in classrooms, they learn to manage unscripted situations, work together, and navigate diverse, complex issues. Collaborative learning, or group work to some, is an established and recognized pedagogical practice to enhance students' learning at the postsecondary level (Brame & Biel, 2015; Braxton, 2006; Pascarella & Terenzini, 1991, 2005). There are multiple definitions and approaches to collaborative learning. The simplest definition

is an instructional method where students work in groups to achieve a common academic goal. According to Smith and MacGregor (1992), collaborative learning is where students work in groups of two or more and search for understanding, solutions, meanings, or develop a product together.

Many researchers have studied the benefits of collaborative learning and how students who participate in group work achieve higher grades, learn at a deeper level, retain information longer, stay in school, develop stronger communication and teamwork skills, and gain an understanding of the workplace environment (Oakley, Felder, Brent, & Elhajj, 2004). Scholarship of teaching and learning indicates active and collaborative learning increases students' learning because they are involved in their education, gain wisdom and insights from their peers, and apply their own knowledge (Kuh, Kinzie, Buckley, Bridges, & Hayek, 2006).

The current generation of traditional college and university students, the Millennials, are influenced by technology, and it has shaped their childhoods, education, and careers (Gibson & Sodeman, 2014). Millennials have grown up with technology, and it is now fully integrated into multiple aspects of their lives. According to Gibson and Sodeman, "scholars recognize millennials are so comfortable learning and adapting to technological change, that they are in deficient in soft skills" (2014, p. 65). On the other hand, the next generation of learners and future employees after the Millennials, is Generation Z. This generation is also heavily influenced by technology, and they are characterized as not being team players because they prefer to communicate via electronic devices and social media (Igel & Urquhart, 2012).

While there are as many benefits and challenges to group work, there are also many approaches to collaborative learning. Instructors use collaborative learning approaches such as cooperative learning, problem-centered instruction, writing groups, peer teaching, discussion

groups and seminars, and learning communities (Smith & MacGregor, 1992). A new framework is debuting in postsecondary education, which may positively influence collaborative learning methods in the classroom. This ideology, or framework, is Agile. Agile was developed for the software development industry due to its success in the software development industry, Agile is being implemented in other industry sectors and disciplines, such as education, human resources, marketing, and retail.

In 2001 a group of software professionals came together and invented a new way to develop computer software emphasizing the value people bring to work. They called this new way of thinking and working "Agile" (Beck et al., 2001). This group wrote the "Manifesto for Agile Software Development" or "Agile Manifesto" and named themselves the "Agile Alliance" (Beck et al., 2001). Martin Fowler is credited with suggesting the word "Agile" (Beck et al., 2001). Stellman and Greene (2014) define Agile as: "A set of methods and methodologies that help your team to think more effectively, work more efficiently, and make better decisions" (p. 2).

Agile is beginning to replace the traditional "waterfall" development method and has expanded into other industry sectors (VersionOne, 2016; Rashmi & Naresh, 2013). The waterfall method is a classical project management methodology that has a linear and sequential process. The waterfall model is divided into different phases, and the output of one phase is used as the input of the next phase. Every phase must be completed before the next phase starts, and there is no overlapping of the phases, hence the graphic illustration of a "waterfall." In the software industry sector, Agile has increased the success rates of teams, improved the quality and speed software gets to the market, and enhanced the motivation of productivity of software teams

(Rigby, Sutherland, & Takeuchi, 2016). Agile is used in manufacturing, healthcare, utilities, public services, insurance, retail, hospitality, and education (VersionOne, 2016).

Agile is also used in K-12 schools and classrooms. In 2014, a failing "at-risk" high school called Hope High, faced possible closure. The school board hired a new principal, who joined forces with the new CEO of their parent organization, and they implemented an Agile learning environment and culture. Hope High introduced "Agile Classroom.," (Miller, 2015). Agile Classrooms is based on a network of self-organizing teams that work together to deliver the highest value in a fast-changing environment, such as education. At Hope High, teachers, who had lost all respect and control with their students, used social contracts (an Agile practice) to create a transparent process for learning and progress (Miller, 2015). This process helped students feel more respected and heard, which increased their engagement in classes. After two years of operating in an Agile mindset, Hope High's test scores on state assessments and benchmarks have skyrocketed, and fighting among students and classroom disruptions have been reduced (Miller, 2015).

At the postsecondary level, the Agile faculty learning community at Miami University in Oxford, Ohio, has postsecondary faculty members across six different colleges, and they study how the concepts, practices, and benefits of Agile apply to higher education (Krehbiel et al., 2017). After two years of research, this faculty group found "that its adaptations of Agile to higher education produced positive outcomes by increasing student engagement, encouraging students to take responsibility for their learning, enhancing the level and quality of collaboration, and producing higher quality deliverables" (Krehbiel et al., 2017, p. 90). According to Smith and MacGregor (1992), collaborative learning is a "flexible, yet adaptable approach appropriate

to any discipline" (p. 9). Agile is also a flexible, adaptable approach to collaboration that can span across disciplines and postsecondary group work.

Agile has been used in the software development industry since the early 2000s, and has yielded strong and continuous results. The success of Agile has inspired other industry sectors to adapt Agile practices. Figure 1 illustrates the different industries Agile is being used in based on the respondent demographics of the VersionOne 2017 State of Agile survey. Even though software development remains the highest, other non-technical industry sectors are using Agile. The VersionOne 2017 State of Agile Report is the first time the education sector had enough respondents to be included in Figure 1.
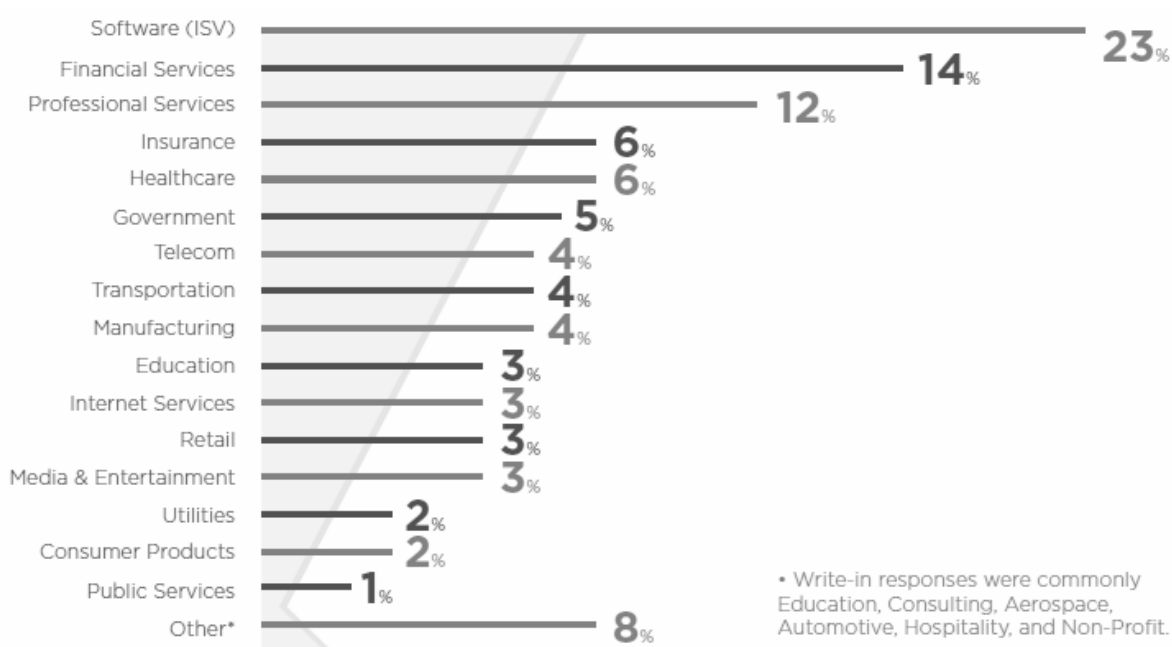
*Figure 1*. Industry sectors using Agile. Reported by the VersionOne 2017 State of Agile Report: https://explore.versionone.com/state-of-agile.

Figure 2 indicates the benefits of adopting Agile as reported by the respondents of the VersionOne 2017 State of Agile Report. There are several benefits listed in Figure 2 that are valuable for teamwork in postsecondary classrooms. The ability to manage changing priorities,

increased team productivity, team morale, project predictably, and project risk reduction are issues collaborative learning methods address (as discussed in Chapter 2) (VersionOne, 2017). Agile is seeing results across diverse industry sectors, and should be explored in depth in higher education.
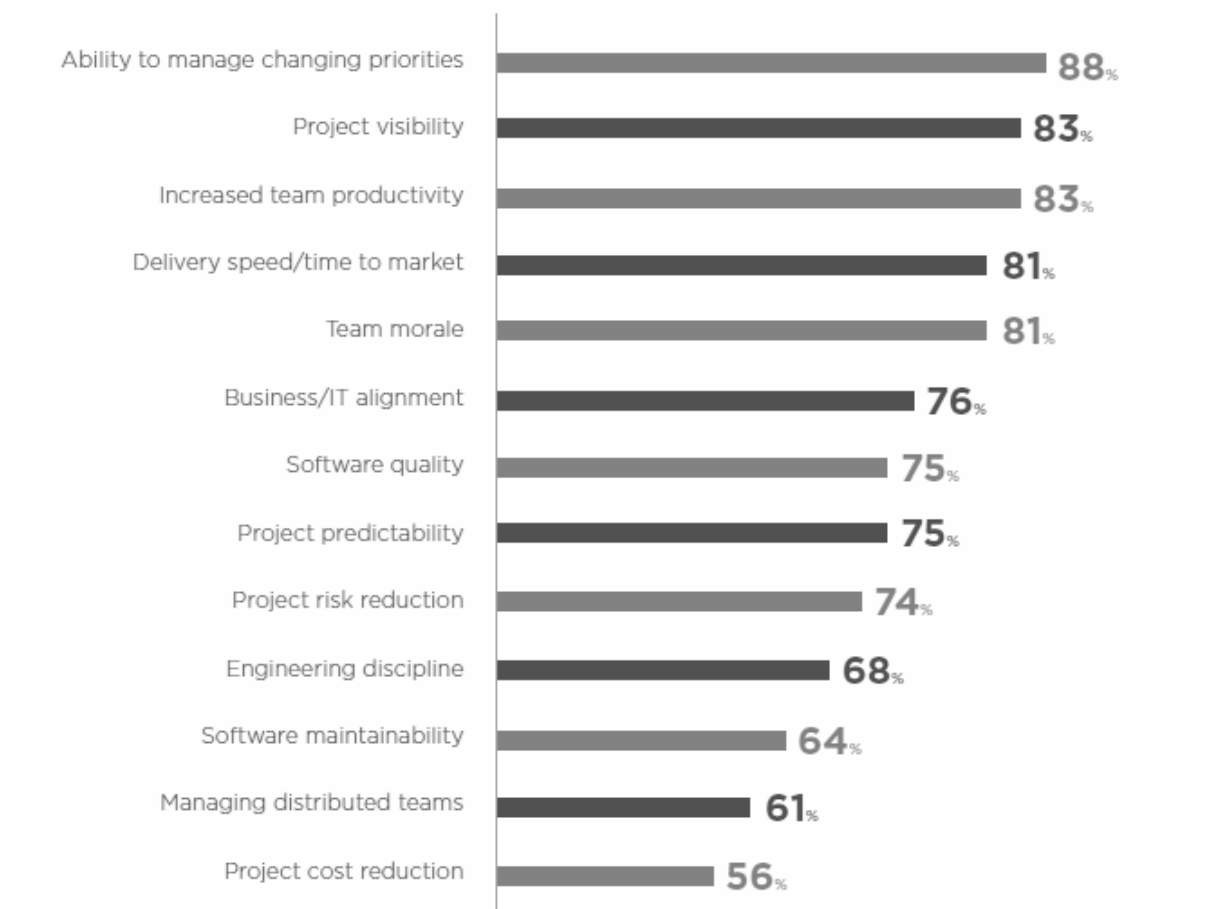
Figure 2. Benefits of adopting Agile 2017. Reported by the VersionOne 2017 State of Agile Report: https://explore.versionone.com/state-of-agile.

Statement of the Problem

Since employers are stating that new graduates lack critical thinking skills, problem solving skills, attention to detail, communication skills, leadership abilities, interpersonal skills, and teamwork skills, postsecondary educators should explore alternative methods and

frameworks to help students develop these skills (Strauss, 2016). Agile was developed to help teams work more efficiently (in the software industry). Additional research is needed to see if using Agile in postsecondary education settings can enhance collaboration activities in the classroom and influence the development of transferable skills new graduates are currently lacking. Research exists on how collaborative learning benefits students by increasing learning because students are involved in their education, gain insights from their peers, and apply their own knowledge (Kuh et al., 2006). Students who participate in group work also learn at a deeper level, retain information longer, stay in school, develop stronger communication and teamwork skills, and gain an understanding of the workplace environment (Oakley et al., 2004). Continuous research needs to be conducted on new methods, such as Agile, to discover added ways to positively influence collaborative outcomes in postsecondary education.

Purpose of the Study

The purpose of research was exploratory in nature and aimed to identify perceptions of the application of Agile in postsecondary classes to affect both the product and process of learning by Agile-practicing faculty. This study aimed to tell the stories of practicing postsecondary Agile faculty to uncover their perceptions about using Agile in postsecondary education, to explore if using Agile influences collaboration, and to collect perceptions about whether Agile influences transferable skills. The researcher contributed new knowledge to the discipline by documenting accounts of instructors who use Agile, and to report on if using Agile practices in postsecondary classrooms influenced collaboration outcomes and transferable skills to the workplace.

Research Questions

The following research questions guided this study:

1) How do instructors begin using Agile in their postsecondary classrooms?

2) What Agile practices are instructors using in classroom instruction for collaborative learning?

3) How does Agile influence collaborative learning in the classroom?

4) How do instructors perceive Agile to develop students' soft skills such as critical thinking, problem solving, attention to detail, communication skills, leadership abilities, interpersonal, and teamwork?

Significance of the Study

This study has the potential to make contributions to teaching and learning. The information collected in these narratives will help increase the understanding of collaborative issues related to teaching and learning through the telling of instructors' stories of using Agile in their classrooms.

Assumptions of the Study

The assumptions made during this study included:

1. Participants would provide honest and transparent responses to the questions asked during the interviews.

2. Participants in this study have adequate experience implementing and using Agile in the classroom.

Limitations of the Study

There were several limitations of this study. First, the study only interviewed three participants, so only these three faculty members' feedback and perceptions are examined and discussed in this study. Second, the three participants interviewed all are faculty members at the same midwestern university.

Positionality Statement

My 18-year career in the Informational Technology sector was where I learned and used Agile in my everyday work life and discovered the benefits it brings to teams. I am an agilist, hold Agile certifications, teach other faculty Agile, and practice Agile in my classroom. I am a story teller by nature. I published a novel and hold master and undergraduate degrees in English. I am passionate about analyzing words and telling them to inform and educate others. As an agilist, I am interested in innovation. As an educator, I am interested in improving student outcomes. As an agilist and an educator, I am interested in innovative ways to improve student outcomes; room, hence this research on using Agile in postsecondary classrooms.

As a member of an Agile faculty learning community and research team, I wanted to focus on how Agile can directly influence collaboration activities in the postsecondary classroom, and if using Agile for collaboration increased the development or refinement of transferable soft skills: critical thinking, problem solving, attention to detail, communication skills, leadership abilities, interpersonal, and teamwork. I am interested in the application of Agile in postsecondary classroom collaboration activities and if there is any correlation between the development of some of the most needed soft skills in the workforce that new college graduates are still lacking.

Definition of Terms

This section contains the working definitions of terms used in this research paper.

Agile. Agile is an ideology; a collection of principles and practices to support rapid development and flexible response to change. Agile was developed in response to waterfall software development methodology to increase value, minimize risk, and respond and adapt quickly to change. Stellman and Greene (2014) define Agile as: "A set of methods and

methodologies that help your team to think more effectively, work more efficiently, and make better decisions" (p. 2).

Agile Manifesto. The guidelines of the Agile way of thinking. It was created in 2001 to bring change to the software development industry by introducing a different way of developing software (Beck et al., 2001). The four core Agile Manifesto values are individuals and interactions over processes and tools, working software over comprehensive documentation, customer collaboration over contract negotiation, and responding to change over following a plan (Beck et al., 2001). The Agile way of thinking prefers focusing on individuals (and teams) and how they interact instead of focusing on business processes and tools used to complete work. The Agile Manifesto prefers to focus on teams creating working software (or a working prototype or product for non-software projects), over a lengthy requirements document. The Agile way of thinking prefers collaborating with customers on the work they are requesting instead of solely relying on the contract or statement of work to complete the project. Agile teams focus on responding to changes based on internal or external influences instead of following a strict project plan. Agile teams prefer a more fluid project plan.

Collaborative learning. The foundational definition for collaborative learning used in this research is where students work in groups of two or more and search for understanding, solutions, meanings, or develop a product together (Smith & MacGregor, 1992). For the purpose of this research, collaborative learning is synonymous with "group work." The following definition was inspired by Bruffee (1993) and Pantiz (1999): Collaborative learning is a philosophy of interaction where students work in small groups to focus on tasks, complete long-and-short term projects, analyze and solve problems, and practice working together. Collaborative learning is student-centered and highlights students' individual skills, abilities, and

contributions, and encourages group cooperation. Students take a more active role in their own learning under the guidance of the instructor.

Daily stand-ups. An Agile ritual where a team meets for 15-minutes to answer three questions: "What did I do yesterday," What am I doing today," and "What blocker/issues are keeping me from working?" In industry, this meeting occurs each day. In education, this meeting can occur each time a group or team meets or each class period.

Group work. Synonymous for "collaborative learning" for the purpose of this research.

Iterative work/project cycles. An Agile team works in an iterative work cycle, called a "sprint" or "iteration," which is normally two-week cycles in industry. Iterations can be any length as long as they are successive. They can align with course objectives or units in education. At the end of each iteration a working prototype is developed.

Planning. Agile groups or teams spend time before each iterative work cycle planning their work for the upcoming iteration. There are different Agile techniques to help teams plan including MoSCoW (Must, Should, Could, Won't) prioritization and estimating (planning poker, Fibonacci sequence). Agile planning techniques are applicable to students and instructors as well.

Retrospectives. An Agile ritual where a group or team reflects on their last iterative work cycle to see what went well, what could be improved, and what lessons they learned. The purpose of this meeting is to inspect and adapt the previous iterative work cycle. Retrospectives help teams to communicate and refine their work processes to improve efficiency and optimization.

Showcases. An Agile ritual where an Agile team demonstrates the work they completed during the latest iteration to their customer, instructor, or stakeholder. This allows an Agile team

or group to receive feedback on their work, which they can incorporate into the next iteration. Showcases help support the Agile Manifesto value of customer collaboration over contract negotiation.

Social contracts. A ritual some Agile teams and groups employ to develop a vision for how the team or group wants to work together. A social contract helps teams and groups to define the behaviors and attitudes they want to see among each other, and is a constant reminder of how they want to work together and how they should conduct themselves.

Sprints. A sprint is a set period of time during specific work has to be completed and prepared for a showcase.

Storyboards. A physical board (white board) or virtual software where a team manages their user story cards (see next definition).

User story cards (User stories). An Agile artifact teams use to represent requirements or interactions for a product or project. A visual picture of a user story card is an index card where the requirements for a project are written. A good practice is to have one requirement per user story card. Story cards help groups and teams manage their work, create accountability among the team, and allow instructors to see the progression of work (or lack of progression). Story cards can be managed physically on a white board, another board, or electronically in software such as Trello.

Chapter II: Literature Review

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). According to Bruffee (1993), collaborative learning began in Britain in the late 1960s. In 1970 British educator Edwin Mason called for educational innovation that explored collaboration (Bruffee, 1993). Primitive collaborative learning also has early American roots. Gere (1987) traced collaborative learning to Benjamin Franklin who used autonomous learning groups to develop his own formal education. According to Bruffee (1993, p. 5), "autonomous peer groups were the only educational resource available to women and most working men" in the eighteenth and twentieth century.

In the 1920s and 1930s there was movement around peer-based education and it lost momentum until the women's movement in the 1960s (Bruffee, 1993). Support groups were developed during the women's movement, and the expertise that arose out of these support groups regenerated interest in peer learning (Bruffee, 1993). In 1962, Theodore Newcomb developed research stating peer-group influence is an important force in undergraduate courses (Newcomb, Wilson, & Baird, 1966). Newcomb et al. (1966) research highlighted how undergraduate peer groups shape the changes their peers' make in values and attitudes. He also stated that postsecondary institutions should harvest the influence students have on one another to help them broaden their perspectives or learn new knowledge (Newcomb, 1962).

Bruffee (1984) attributed the rise of collaborative learning at American postsecondary institutions in the early 1970s as a response to help college students who were failing in their academic courses. Postsecondary institutions began to organize peer tutoring where students taught other students (Bruffee, 1984). Peer tutoring emerged as a way for teachers to reach

students by organizing them into groups to help each other. Bruffee (1984) classified this as "collaborative learning," since the teacher declares the problem and students work collaboratively to solve it. This type of learning may not necessarily change what students learned, but the social context in which they learn (Bruffee, 1984).

Smith and MacGregor (1992) referred to collaborative learning as an umbrella term for educational approaches involving "joint intellectual effort between students or students and teachers together" (Smith & MacGregor, 1992, p. 10). According to Smith and MacGregor (1992), most collaborative learning situations involve students working in groups of two or more to search for mutual understanding, solve problems, create meaning, or develop a product. Collaborative learning became popular in the 1980s to address the following problems in undergraduate education: "the distance between faculty and students, the fragmentation of the curriculum, a prevailing pedagogy of lecture and routinized tests, an education culture that reinforces student passivity, high rates of student attrition, and a reward system that gives low priority to teaching" (Smith & MacGregor, 1992, p. 9). Collaborative learning has "enormous promise for improving student learning and revitalizing college teaching" (Smith & MacGregor, 1992, p. 9). Collaborative learning is flexible and adaptable and applicable to any discipline (Smith & MacGregor, 1992).

Collaborative learning is based on five learning assumptions. The first assumption is that "learning is an active, constructive process," which means that students must actively work with new information or skills in focused ways (Smith & MacGregor, 1992, p. 10). In a collaborative learning situation, students create new meaning, ideas, solutions, or projects with the new information presented to them.

The second learning assumption is that "learning depends on rich contexts," which means that learning is primarily influenced by context and activity (Smith & MacGregor, 1992, p. 10). In collaborative learning, students start with a problem and apply facts and ideas to arrive at a solution. Students become active participants in the learning process, which helps them develop higher order reasoning and problem solving skills (Smith & MacGregor, 1992).

The third learning assumption is that "learners are diverse" (Smith & MacGregor, 1992, p. 10). Students come from diverse backgrounds, learning experiences, and have individual goals and objectives. Collaborative learning allows students to apply their own unique set of experiences and ideas to the same problem, learn from each other, and allows instructors to observe how students are learning and what experiences they bring to their learning (Smith & MacGregor, 1992).

The fourth learning assumption is that "learning is social" (Smith & MacGregor, 1992, p. 10). By having students discuss a problem, they are engaging in mutual exploration of the problem, creating meaning from each other regarding the problem, leading to a better understanding (Smith & MacGregor, 1992).

The fifth learning assumption is that "learning has affective and subjective dimensions" (Smith & MacGregor, 1992, p. 11). Collaborative learning activities in classrooms help students build ideas and make connections between each other and their instructors (Smith & MacGregor, 1992). As students listen to diverse viewpoints of their peers, they create their own perspective, which they have to articulate to their group. This process helps students to be responsible for their own learning, which helps them to become life-long learners and achieve true intellectual development (Smith & MacGregor, 1992).

Smith and MacGregor (1992) made the argument that collaborative learning supports a larger educational agenda based on involvement, cooperation and team work, and civic responsibility. Collaborative learning encourages students to be involved—involved with their own learning, with their peers, and instructors. Students who are involved and have higher retention and success rates at postsecondary institutions (Smith & MacGregor, 1992). Collaborative learning activities encourage cooperation and teamwork by helping students to learn to resolve differences, arriving at an agreement or resolution that reflects all group members' opinions, and caring for their fellow group members (Smith & MacGregor, 1992). These skills are vital to living in a community (Smith & MacGregor, 1992). Collaborative learning encourages essential skills needed in a democracy, such as having an active voice, listening to others, engaging in conversations, and building consensus (Smith & MacGregor, 1992).

Smith and MacGregor (1992) outlined six different mainstream approaches to collaborative learning in the classroom. However, collaborative learning comes in all varieties from everything to small group work focused on a task in one class period to semester-long group projects. The six main types of collaborative learning Smith and MacGregor (1992) identified are cooperative learning, problem-centered instruction, writing groups, peer teaching, discussion groups, and learning communities.

Advantages and Challenges

There are advantages and challenges for instructors and students using collaborative learning in the postsecondary classroom. Smith and MacGregor (1992) state that collaborative learning raises fundamental questions for instructors about the purpose of their classes, student roles and responsibilities, the connection between educational form and content, and the nature

of knowledge. One major challenge of collaborative learning is that it is a shift from the common lecture-based instructional method in most postsecondary institutions (Smith & MacGregor, 1992). Instructors who employ collaborative learning practices combine the standard lecture and listen instructional methods with other methods that combine students' discussions and active involvement with the course material (Smith & MacGregor, 1992).

Instructor advantages. Smith and MacGregor (1992) stated that instructors who use collaborative learning desire to motivate their students by having them engaged. Collaborative learning takes practice and faculty collaboration is important in the design and experimentation of collaborative learning in classrooms (Smith & MacGregor, 1992). Smith and MacGregor (1992) stated that instructors who implement collaborative learning in their classrooms find it "enormously energizing and liberating" (p. 21). Instructors who use collaborative learning approaches provided unique opportunities by creating or re-creating activities and problems that engage students (Smith & MacGregor, 1992). Instructors also commented on how they gain a new perspective on their subject matter and are challenged by the opportunity to continuously examine and re-shape their classes (Smith & MacGregor, 1992). Successful collaborative learning classrooms challenge instructors to be "coaches and facilitators of complex social processes" (Smith & MacGregor, 1992, p. 22).

Instructor challenges. Collaborative learning posed challenges to instructors because it goes against the traditional teacher-centered, lecture-driven college teaching model, and it required instructors design their courses and syllabi differently (Smith & MacGregor, 1992). Instructors needed to plan class time for students to work together while ensuring students met the learning outcomes for the course. This can create tension between student learning and covering all the required content (Smith & MacGregor, 1992). According to Smith and

MacGregor (1992), as instructors become more skilled and versed in collaborative learning, they start to see challenges to traditional instructor-centered teaching. Their classrooms become "independent communities" (Smith & MacGregor, 1992, p. 20). This independent learning community challenged traditional classroom roles and forced instructors to rethink their role as instructor and their course content.

Another challenge to instructor-centered teaching in a collaborative classroom was the role students take on as they become more involved in their learning. Students take on a student-centered or learner-centered role, which allows students to help shape the classroom by providing input to what the class should study (Panitz, 1999). Student input can change the instructor's curriculum, structure, and classroom dynamics.

Collaborative learning also challenges the traditional structure of postsecondary curriculums where lower division courses are designed for large lecture sessions to be completed in a certain time period, for example 50 minutes (Smith & MacGregor, 1992). This lecture-centered model is reinforced by institutions that favor limited engagement in teaching so faculty can conduct research (Smith & MacGregor, 1992).

Student advantages. Students of collaborative learning classes become directly engaged in the concepts of the class (Smith & MacGregor, 1992). They develop confidence in their skills to critically analyze ideas and problems, share their thoughts and ideas with their teammates, ask questions, and actively listen and respond to their teammates' questions (Smith & MacGregor, 1992). This helps students to develop interpersonal and intellectual skills.

Beccaria et al. (2014) state that group work is an important teaching method to help students develop group work skills and activate deep learning. Their research is in nursing education, but their perspective on group work is not discipline specific. Students need to

develop group work skills for education and the workforce, but also for lifelong learning (Beccaria et al., 2014).

Beccaria et al. (2014) defined group work projects as "an assignment of two or more people interacting with each other and interdependently working tougher to achieve specific objectives" (p. 1095). Group work is an effective learning strategy at the postsecondary level 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). Group work skills also provide practice and preparation for the workforce, which demands collaboration and group work skills (Beccaria et al., 2014).

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). Since not all students have the skills to be successful in a group environment, a range of group work skills needs to be actively developed and taught to avoid come of the common issues with group work (Beccaria et al., 2014).

Educators can improve the group experiences of students by ensuring there are explicit learning outcomes, clearly communicating the value and process of group work, ensuring equitable distribution of grades, incorporating peer and self-assessment in group work, and providing targeted group skills training (Beccaria et al., 2014). Other factors that influence the success of group work are having diversity in group members, designing a group work

development program, allowing students to reflect on their strengths and weaknesses, and using strategies to enhance time management and goal setting, as individuals and as a group (Beccaria et al., 2014).

Student challenges. The nature of collaborative learning pedagogy and the instructor's role in a collaborative learning classroom may cause disadvantages to students working in groups. First, collaborative learning pedagogy only defines one social role for a group—the recorder, who captures the group's discussions and is the voice for the group (Bruffee, 1995). There are no other group roles assigned. If a group struggles with self-governance, organizing the roles and work may be an obstacle.

Second, collaborative learning pedagogy recommends that teachers not intervene in student working groups or that they only intervene under certain conditions (Bruffee, 1995). This leaves students to self-govern their working groups and develop their own approach to completing the assigned work. In collaborative learning classrooms, if working groups have questions about the assignment or social roles, the instructor is supposed to turn those questions back to the groups to resolve (Bruffee, 1995).

The third possible disadvantage to students is that collaborative learning pedagogy suggests that instructors not evaluate students on how a group builds and maintains their relationships since they are not supposed to be involved with the student working groups (Bruffee, 1995). However, instructors should grade students individually on what they have learned collaboratively (Bruffee, 1995). Collaborative learning encourages dissent in student working groups to gain knowledge and understanding (Bruffee, 1995). If students within a group question each other, rebel against the instructor, or question the tasks and other questions, they may gain an understanding they did not have before (Bruffee, 1995).

Since Agile is associated with teamwork and improving how teams work and collaborate, the different types of collaborative learning were surveyed in this literature review. First, this chapter outlines the theoretical framework for the study and how collaborative and cooperative learning is rooted in constructivist epistemology. Cognitive and social constructivism is discussed, including Jean Piaget's individual constructivism and how individuals must construct their own knowledge, and Lev Vygotsky's social constructivism, where individuals learn from each other in social contexts.

Second, this chapter explores the history, overview, instructor advantages and challenges, and student advantages and challenges to six different types of collaborative learning: cooperative learning, problem-centered instruction, writing groups, peer teaching, discussion groups, and learning communities.

Third, this chapter presents a history and overview of Agile. In addition, a survey of current Agile research in education was presented. This section explored Agile in PK-12 education, Agile in post-secondary education, Agile education manifestos, Agile education principles, and Agile educational philosophy.

Theoretical Framework

The theoretical framework that guided this study is constructivism. The definition of constructivism this study uses is: "The theory of constructivism states that the knowledge possessed by an individual in a comprehensive 'construct' of facts, concepts, experiences, emotions, values, and their relationships with each other" (Baviskar et al., 2009, p. 543). Constructivist theory is based on how people learn and construct knowledge. While Jean Piaget and Lev Vygotsky are often considered the fathers of constructivism, Piaget for individual constructivism and Vygotsky for social constructivism, Jones and Brader-Araje (2002) argued

that themes of constructivist thought appeared in the early 1700s. Giambattista Vico in 1710 wrote how the mind only knows what the mind has made (Jones & Brader-Araje, 2002). Other constructivist theorists include John Dewey, Maria Montessori, David Kolb, Jerome Bruner, and Ernst von Glasersfeld.

Piaget's cognitive constructivism focused on how the individual obtains knowledge. His theory of cognitive development focused on the fact that people cannot just be given information which they can understand and use. People must have the opportunity to create their own knowledge (Piaget, 1953). Piaget outlined stages of development on how children learn at different stages, but also how they construct knowledge differently and at their own pace. He outlined four cognitive developmental stages children go through, and their sophistication of thought increased with each stage.

Vygotsky's social constructivist theory used the principle that humans learn from each other from social interactions (Vygotsky, 1986). Vygotsky's research suggested that students' learning in the classroom is derived through social interactions with their peers and instructors. In his socio-cultural theory, Vygotsky (1978) believed that students cannot understand a new concept or idea unless they receive feedback from their instructor or peers. His socio-cultural theory focused on the role others play and the greater community in the learning process (Jones & Brader-Araje, 2002). Vygotsky also believed that language influenced a higher order of thinking, reasoning, writing, and reading among learners (Vygotsky, 1978).

Constructivism is learner-focused because the knowledge possessed by an individual is constructed of that individual's facts, experiences, values, emotions, and relationships with other people (Baviskar et al., 2009). The role of the instructor in constructivism is to create an environment that motivates the learner to learn so they can make changes to their knowledge by

accepting or rejecting new information and applying it (Baviskar et al., 2009).   According to

Baviskar et al. (2009, p. 541), "constructivism is an important theory of learning that is used to

guide the development of new teaching methods," which seems appropriate for evaluating Agile

in postsecondary education.

Collaborative Learning Types

This next section will present the different types of collaborative learning that occurs in

education environments. There are six types of collaborative learning methods evaluated and

each one addresses the history of the collaborative learning method, instructor advantages,

instructor challenges, student advantages, and student challenges.

Cooperative learning. Research studies regarding competitive, individualistic, and

cooperative theories began in the 1800s in the United States and in England (Johnson, Johnson,

& Smith, 1998). In the early 1900s, scholars in Germany and France were conducting studies

about cooperative learning. The 1920s and 1930s brought the publication of two major research

reviews on cooperation and competition (Johnson et al., 1998). Dewey is also attributed to

supporting cooperative learning with his writings on how learning is social in nature (Panitz,

1999).

The history of cooperative learning in postsecondary classes dates back to the early 1900s

when Kurt Koffka, one of the founders of the Gestalt school of psychology, began theorizing

about social interdependence (Johnson, Johnson, & Smith, 2014). Cooperative learning is rooted

in social interdependence theory. Koffka proposed that interdependence could vary among

group members since groups were a dynamic whole (Johnson et al., 2014). In the 1920s,

Koffka's colleague, Kurt Lewin, expanded on Koffka's work. Lewin stated that a group's

essence is its interdependence, which means that a change in a member of the group influences

the other group members (Johnson et al., 2014). He also stated that an intrinsic state of tension among group members motivates the group to achieve the common goals (Johnson & Johnson, 1989). Interdependence exists when more than one person is involved and the people involved influence each other in a way that causes change to occur in the others (Johnson & Johnson, 1989). Lewin's students and colleagues furthered his research by stating that the drive for accomplishment motives cooperative and competitive behavior (Johnson & Johnson, 1989).

Morton Deutsch, one of Lewin's graduate students, built on Lewin's research and developed a theory of cooperation and competition in the 1940s (Johnson & Johnson, 1989). Deutsch's cooperative learning research is the foundation for cooperative learning education today.

An overview. Johnson et al. (2014) define cooperative learning as "the instructional use of small groups so that students work together to maximize their own and each other's learning" (p. 87). In cooperative learning, students work together to achieve shared learning goals, and students achieve their learning goals only if all the members in their group achieve their goals (Johnson et al., 1998). According to Johnson et al. (1998), cooperative learning is the "heart" of problem-based learning and is related to collaborative learning (p. 28). Collaborative learning emphasizes that learning occurs naturally as an effect of students working together in unstructured groups to create their own learning (Johnson et al., 1998). Cooperative learning is often contrasted with competitive and individualistic learning (Johnson & Johnson, 2014).

There are three different types of cooperative learning: formal cooperative learning groups, informal cooperative learning groups, and cooperative base groups (Johnson & Johnson, 1999). Formal cooperative learning is a group of students who work together for one class period or several to achieve shared learning goals and complete specific assignments (Johnson &

Johnson, 1999). In formal cooperative learning groups, instructors have a specific role. They specify the objectives for the assignment(s), determine the size of the groups and the method for assignment of students, the roles of the students, provide the materials needed, and decide how the classroom is arranged. Instructors of formal cooperative learning groups explain the assignment at hand and provide support to the student groups as they work. They monitor the students' learning and can assist groups with the assignment or coach group members on how to work in groups. Instructors also assess student learning and reflect on how well they functioned as a group (Johnson & Johnson, 1999).

The second type of cooperative learning is informal cooperative learning, which is when students work together in temporary groups that last a few minutes or one class period to achieve a shared learning goal (Johnson & Johnson, 1999). For example, during a lecture or demonstration, cooperative learning groups can be used to set expectations to what will be covered during the session, create an atmosphere that is conducive to learning, help students focus on the material being discussed, help students to process the material, and provide closure to a class or lesson (Johnson & Johnson, 1999).

The final type of cooperative learning is cooperative base groups, which are "long-term, heterogenous cooperative learning groups of 3-4 members with stable membership" (Johnson & Johnson, 1999, p. 69.) Cooperative base groups provide group members with support and encouragement to make academic progress and develop socially. These groups are permanent and can last one or more years as students move through school (Johnson & Johnson, 1999).

Five elements of cooperative learning. Cooperative learning has five elements (Johnson & Johnson, 1999; Johnson & Johnson, 1989). The first element is positive interdependence, which means that group members are connected and cannot succeed unless the other members

succeed (Johnson & Johnson, 1999). The second element of cooperative learning is individual accountability (Johnson & Johnson, 1999). This element is evident when each individual group member is assessed based on their performance and that feedback is given to the individual and the group, so individuals can become stronger (Johnson & Johnson, 1999). The third element is face-to-face promotive interaction, which exists when individual group members assist each other to be successful by encouraging, supporting, and helping, and providing positive feedback (Johnson & Johnson, 1999). The fourth element of cooperative learning is social skills because interpersonal and small group skills contribute to the success of a cooperative group (Johnson & Johnson, 1999). The final element is group processing, which is when group members discuss with each other how they are progressing in achieving their goals and when they maintain effective relationships with the other group members (Johnson & Johnson, 1999).

   Instructor advantages. Cooperative learning is based on social interdependence theory, which is validated by research so it can be applied to instructional practice (Johnson et al., 2014). There is theory and data to support using cooperative learning pedagogy in the classroom (Johnson et al., 2014). Cooperative learning provides a structured environment where the responsibility of learning is shared between the instructor and the students (Johnson, Johnson, & Smith, 1991).

   Cooperative learning provides instructors with a flexible guideline of procedures they can use to implement cooperative learning into their classrooms (Johnson, Johnson, Holubec Johnson, & Roy, 1984). There is not one specific way of implementing cooperative learning; the theory is flexible so it can be adjusted to every instructor's needs.

   Instructor challenges. American culture is deeply rooted in individualistic efforts versus team work (Johnson et al., 1998). Students who have not been taught how to work in groups or

how to be an effective group member do not know how to work in groups (Johnson et al., 1984).

Instructors who want to incorporate cooperative learning into their classrooms should also help

students learn to work effectively in groups. If students are placed in groups and instructed to

work together, this does not guarantee that they will be a cooperative group (Johnson & Johnson,

2014).

Instructors must learn how to teach in a cooperative learning environment and structure

their classes in a cooperative context (Johnson et al., 1984). Even if instructors structure their

lessons to be cooperative, they still must teach students cooperative skills (Kagan & Kagan,

2009). Instructors who are first using cooperative learning methods in their classroom may

observe that their students do not know how to collaborate (Johnson et al., 1984). Besides

developing cooperative lessons, instructors must observe their students as they work to see if

they need to intervene or provide coaching on social skills. The instructor must be involved in

monitoring the groups and not just sitting behind the desk.

Student advantages. There are several student advantages to cooperative learning

experiences. Johnson, Maruyama, Johnson, Nelson, and Skon (1981) reviewed 122 studies on

cooperative learning between 1924-1981. Their findings indicate that cooperative learning

experiences are likely to promote higher achievement when compared to individualistic and

competitive learning environments (Johnson et al., 1981). According to Johnson and Johnson

(1983), cooperative learning helps students to use higher reasoning and critical thinking

strategies. Cooperative learning experiences also help students have a positive attitude toward a

subject and the instructional experience, and to be motivated to learn about the subject area

(Johnson & Johnson, 1983). A survey of more recent literature supports many of the same

results. Cooperative learning creates a supportive learning environment and creates positive

social outcomes and a for students in the classroom, such as problem solving, teamwork and interpersonal skills, empathy, higher self-esteem, and lower absenteeism (Kagan & Kagan, 2009; Koçak, 2008; Johnson et al., 1998). Kagan and Kagan (2009) report that a lack of cooperation and communication is a common reason people are fired from their first job. Nauert (2011) states that a sense of community and involvement and solid interpersonal skills developed during postsecondary education greatly benefit a graduate's transition into the workforce.

Since cooperative learning is an active learning method compared to lecture-based instruction, students may retain more information (Koppenhaver & Shrader, 2003). Students also have greater responsibility on their own learning, and are more motivated to be prepared for class so they do not disappoint their peers in a cooperative environment (Koppenhaver & Shrader, 2003). Cooperative learning also promotes students to interact with one another, encourage the success of one another, and collectively pool their resources to achieve a common goal (Koçak, 2008).

Cooperative learning also prepares students to meet the challenges of the 21st century, which Johnson and Johnson (2014) outline as increasing global interdependence, increasing number of world democracies, the increasing for creative entrepreneurs, and the increasing need of interpersonal relationships. Collaborative skills in the academic and workforce can help address these 21st century challenges (Johnson & Johnson, 2014).

Student challenges. Cooperation is a skill that students are not born with and must be acquired and require effort on their part to learn. The culture and reward systems of American society and educational institutions are geared toward competitive and individualistic work. (Johnson et al., 1998). Schools emphasize individual grade point averages and class rank. Students must take on the responsibility for their group's learning and achievement, which

means assisting and encouraging their peers to succeed (Koppenhaver & Shrader, 2003; Johnson & Johnson, 1999).

Since most faculty must educate themselves on cooperative learning, it can cause a negative cooperative group experience for students in courses with underprepared faculty (Johnson et al., 1998). Students may also resist a change from lecture-based instruction to cooperative learning because they believe their instructors should teach them what they need to know; not their peers (Johnson et al., 1998).

Problem-centered instruction. Dewey believed that students should and work cooperatively in groups to solve be real-world problems in the classroom (Dewey, 1966). Dewey's support of having students collaborate to solve problems they may encounter in the real-world is the foundation for problem-centered instruction. Professional schools, such as medicine, law and business, often use problem-centered instructional methods, particularly case studies in their instructional methods (Smith & MacGregor, 1992).

Problem-centered instruction, also referred to as problem-based learning, started being used in medical education programs in the 1950s by M.L. Johnson Abercrombie (Smith & MacGregor, 1992). Abercrombie's research in collaborative learning in medical education began in England then moved to Canada and the United States. Her research observations supported discussion methods as an instructional approach because when people work in teams, they make more sound judgements than when working independently (Smith & MacGregor, 1992). This is because people gain other perspectives and use this information to influence their judgments, instead of just using the first thought that comes to mind (Abercrombie, 1960). The Community College of Philadelphia participated in the Association of American Colleges and University Advancing Underserved Student Success through Faculty Internationality in Problem-

Centered Learning project (Acosta-Morales, McCool, Murphey, & Stephens, 2016). In a summary of this project, faculty reflected that problem-centered and experiential learning assignments helped students to learn beyond their current course objectives and start to develop other competencies such as "effective communication, critical thinking, and responsible citizenship" (Acosta-Morales et al., 2016, p. 13). This discussion method instructional approach where students collaborate in groups is evident in the problem-centered instructional approaches of Guided Design, case studies, and simulations.

An overview. The problem-centered instructional approaches of Guided Design, case studies, and simulations immerse students in complex problems that they must work together in groups to analyze and solve (Smith & MacGregor, 1992). These three approaches help students develop problem-solving and decision-making skills and navigate complex relationships (Smith & MacGregor, 1992).

Guided Design was developed in 1969 at West Virginia University as a new approach to better teach engineering students, but has been adapted to other disciplines (Wales & Stager, 1978). In Guided Design, students work in small groups to analyze and address open-ended problems. By working in groups to solve problems, students who are actively seeking solutions to problems instead of passively assimilating information, will be better educated (Wales & Stager, 1978). Instructors develop open-ended problems based on the subject students need to learn, and provide written instructions with a model answer. These problems do not have one correct answer, and students must address the problems in sequence of decision-making steps, and are not allowed to advance to the next step until the current one is addressed (Wales & Stager, 1978). Students work in groups of four to seven and the group outlines their plan for addressing the problem, and the resources they will need. Guided Design problems may take

one to five weeks of class time to solve. After the student groups' have completed their action plan for addressing the problem, the instructor provides written feedback highlighting the strengths and weaknesses of their solution. Students are expected to learn the same amount of information, but students' motivation is increased because they need to develop an effective solution (Wales & Stager, 1978).

The case method teaching approach, which uses case studies to engage students in rea-world problems, is prevalent in professional education especially business, medicine, and law. Case studies were first created by the first dean of Harvard University's Business School in the early 1900s (Smith & MacGregor, 1992). Case studies use a real-life story or narrative that describes a problem, which students are to analyze and resolve. Effective case studies describe an actual event or scenario and are complex and realistic (Smith & MacGregor, 1992). Case studies present a significant number of facts, event sequences, and information about related problems. This format requires students to apply material from other courses, outside knowledge, and have meaningful discussions (Grupe & Jay, 2000). While using case studies does not require collaboration or students working in group, case method teaching suggests students examine case studies in groups (Smith & MacGregor, 1992). Case studies are an effective teaching strategy because they promote active learning, critical thinking skills, problem- solving skills, analysis skills, and problem identification (Popil, 2011).

The final problem-centered instructional approach discussed in this section is simulations. Simulations started being developed for education in the 1960s; however, using games in education can be traced to playing chess in the eighteenth century (Cruickshank & Telfer, 1980). In the nineteenth century, Prussia used maps and special pieces to practice simulating for war where teams competed instead of individuals (Cruickshank & Telfer, 1980).

Simulations provide a role-playing environment that simulates real-life experiences (Smith & MacGregor, 1992; Cruickshank & Telfer, 1980). Smith and MacGregor (1992) state: "simulations provide one of the most open-ended forms of collaborative learning and often the most exciting way to get students involved" (p. 15).

Instructor advantages. Guided Design believes that instructors can provide their students with more than just knowledge—they can model to their students how to make a decision (Wales & Stager, 1978). Instructors model professional reasoning and demonstrate to students how the classroom material can assist them in making better decisions (Wales & Stager, 1978). In a Guided Design classroom, instructors move from group to group listening, asking leading questions, and helping students to equally participate in the decision-making (Wales & Stager, 1978). This allows instructors to help students think through the process before declaring they are finished.

In 1990, Newsome and Tillman conducted a study on the effect of Guided Design and lecture teaching strategies on first quarter student nurses and their clinical problem-solving abilities. Their study aimed to developing new approaches to teaching nursing diagnoses (Newsome & Tillman, 1990). The nursing students were assigned randomly two different groups—one Guided Design and one lecture. The Guided Design group experienced written simulations and small group interaction and the lecture group experienced lectures-only. Each group received 10 hours of instruction and then the same groups had six weeks of clinical practice. Each group of nursing students was administered an objective exam to measure the knowledge of the nursing process, and then each student's performance in problem solving was measured in a care plan evaluation tool. The Guided Design group scored significantly higher

than the lecture group in preparing a patient care plan. The objective exam results were not significantly different (Newsome & Tillman, 1990).

Case studies provide instructors with multiple advantages. Using case studies provides a versatile teaching method for an instructor while providing students with an opportunity to examine complex, real-world situations they may encounter in their future professions (Mostert & Sudzina, 1996). By adding case studies, instructors can provide a student-centered learning experience, which can be superior to lecture-based instruction (Grupe & Jay, 2000). Case studies encourage students to participate in substantive discussion and debate on a complex topic (Grupe & Jay, 2000). Instructors also seem to gain significant professional insight by writing their own cases (Mostert & Sudzina, 1996). Case studies can also help instructors reflect on their teaching methods, renew interest in teaching the course content, and create more enthusiasm that is passed down to students (Kunselman & Johnson, 2004).

Research indicates that students gain knowledge through simulations at the same level as other teaching methods (Cruickshank & Telfer, 1980). Students with low academic performance may improve due to their interest in engaging in the simulation (Cruickshank & Telfer, 1980). Simulations also help students to work together in groups, develop friendships with those different from them, improve their attitudes toward school, and improve their perception of being successful (Cruickshank & Telfer, 1980).

Instructor challenges. In Guided Design, instructors may face some challenges. It takes time to develop open-ended problems based on the course material. Some instructors prefer lecture-based teaching to group instruction. It can be difficult to manage multiple small groups in large classes. Instructors using the Guided Design approach may encounter resistance from

students who prefer lecture-based instruction or who are unmotivated to participate in a group (White & Coscarelli, 1986; Wales & Stager, 1978).

There are instructor challenges to using case studies as a form of instruction. Case studies can take substantial time and resources to develop (Popil, 2011; Mostert & Sudzina, 1996). There are limited guidelines for instructors to use to develop their own case studies, and the quality of existing case studies vary greatly between disciplines (Mostert & Sudzina, 1996). The case teaching method works best for class sizes of 12-15, but many classes have more students than 15 (Mostert & Sudzina, 1996). In larger courses, instructors who use case studies can assign the role of "recorder" to each group. The recorder reports on the group's progress with the case analysis to the entire class (Mostert & Sudzina, 1996). Instructors who are not experienced in the case teaching method may not know what to emphasize while teaching the case or what questions to ask to help guide the discussion (Mostert & Sudzina, 1996). Inexperienced instructors or poorly written case studies frequently leave out feedback on what actually happened to provide to the students after the case study ends (Grupe & Jay, 2000).

Cruickshank and Telfer (1980) outline several instructor challenges with using simulations in the classroom. First, simulations can cause instructors several challenges. Second, research indicates that not all subjects benefit from using simulations such as evaluating art and writing. Third, Simulations are not readily available for all subjects and can be expensive to purchase or license. Fourth, if simulations require time to setup or experience technical difficulties, they can use valuable class time.

Barriers to adopting simulations into classrooms are still prevalent today. Justice and Ritzhaupt (2015) outline several obstacles to instructors implementing simulations in their classrooms: "cost of equipment, lack of time to plan and implement, inability to try before

purchasing, lack of balance between entertainment and education, lack of available lesson plans/examples, lack of alignment to state standards/standardized testing, inability to customize a game/ simulation, and inability to track student progress within the game/simulation" (p. 86).

Student advantages. In Guided Design, students develop social skills for working in groups, improve their communication skills, learn how to reconcile and discuss differences, and how to reach a common decision (Wales & Stager, 1978). Dunst, Trivette, and Hamby (2010) report that Guided increases method higher-order problem solving and metacognitive thinking abilities. Guided Design research also indicates that students who experience decision making through Guided Design experiences have increased problem-solving skills (Fernandes & Noretsky, 1984; Morse, 1984; Marshall, 1981; Redden & Petriello, 1980; Wales & Stager, 1978). Guided Design also helps improves students' retention of knowledge, which improves their grades (Wales & Stager, 1978). In an undergraduate introductory control engineering course, a Guided Design experience was used, and the researchers reported that the Guided Design experience enhanced students' critical thinking, helped them develop confidence in their design skills, and prepared them for their future capstone project (Dhaouadi, Al-Assaf, & Rehman, 2012).

Mostert and Sudzina (1996) outline several student advantages in the case teaching method. Case studies help students to participate in discussions and develop critical thinking, analytical, problem solving, and decision-making skills. Students seem to be interested in case studies and therefore interact and collaborate with their classmates. Case studies also help students to explore and critically think about problems or dilemmas in their future professions. Students who engage in case studies learn to understand complex issues and manage interrelated processes (Kunselman & Johnson, 2004).

Cruickshank and Telfer (1980) outline several advantages to simulations. When students engage in simulations in the classroom, they encounter real-world experiences and what it is like to participate in them, but in a safe environment. If an error is made in a simulation, there are no real-world consequences. Simulations provide students with opportunities to solve problems and witness how others solve the same problem. Students receive immediate feedback when interacting with simulations, so they know they are doing. Simulations are engaging to students because they must make decisions and live with the resulting consequences, and they bring a level of interest to academic subjects students find uninteresting. Students also tend to participate in discussions regarding the simulations.

Student challenges. In Guided Design, students may struggle with having the communication and social skills needed to work in groups, coming to a consensus in decision-making, or being motivated to work with others (Wales & Stager, 1978). Students who are unfamiliar with working with case studies may encounter several obstacles. If students are accounted to lecture-based instruction, they may have difficulty in engaging in in-depth discussion and analysis of a complex issue (Mostert & Sudzina, 1996). Students may also find it difficult to write a response to the case where they are required to express their own feedback— one where the information they need is not located in a textbook or from lecture notes (Mostert & Sudzina, 1996). When analyzing case studies, students may not be able to relate the case to the theoretical base of the course (Mostert & Sudzina, 1996).

Simulations also pose several challenges to students. First, not all students enjoy participating in simulations or game-type activities. Also, some simulations limit the number of people who can play at one time, so some students may have to wait to play (Cruickshank & Telfer, 1980).

Writing groups. Writing groups are one of the oldest forms of social collaboration. Over the course of a few centuries, writing groups have been referred to as helping circles, response groups, writing laboratories, the round table, writing teams, class criticism, workshops, and peer tutoring to just list a few (Gere, 1987). The emergence of writing groups began in several institutions and literary societies during the colonial era of the United States (Gere, 1987). In the early eighteenth century and late nineteenth century, literary societies were founded at higher education institutions across the United States and were originally used as a forum for students to debate public issues. These forums developed into students reviewing each other's writing to improve their writing skills (Gere, 1987). Literary societies also served as a social outlet for members as they discussed and debated current political topics, which brought intellectual growth. Many literary societies critiqued their own work and reflected on how to improve their activities and meetings (Gere, 1987).

In the late nineteenth century, when English composition entered college curricula, it did not include the peer critique aspect that was found in literary societies' writing groups. However, college and universities began to model the peer critique of these literary society groups and incorporated them into English departments and curriculum (Gere, 1987). In the 1930s Burges Johnson of Syracuse University conducted research that compared students' writing in a traditional composition class that did not use writing groups and in a composition class that exclusively used writing groups (Johnson & Hartley, 1933). Johnson and Hartley (1933) conducted this study for three years and found that students who were in the course that used writing groups made the most improvement in their writing. In the 1960's writing groups were established as a method to reform the way writing was taught in English departments at the secondary level (Smith & MacGregor, 1992).

An overview. The theory and practice of teaching of writing is the largest focus of collaborative learning in undergraduate courses (Smith & MacGregor, 1992). Even though writing groups first appeared in college writing classes, writing groups are now found in courses in other disciplines (Smith & MacGregor, 1992). Writing groups are based on the theory that writing is a social activity, and participating in writing groups with their peers helps students to see writing as a social process (Smith & MacGregor, 1992; Gere, 1987). A writing group consists of students working in small groups at every stage of the writing process—from developing topics, to declaring a position writing a thesis, to reviewing (Smith & MacGregor, 1992). Working in groups alongside their peers helps students to think about their ideas, discuss them with others, and then determine how to express their ideas in words. In writing groups students exchange their drafts (paper or electronically) and obtain feedback, either verbally or written, from their peers (Smith & MacGregor, 1992).

Writing groups are increasing among post-secondary faculty members as they work together to increase their writing skills as they work on publications (Fleming et al., 2017; Olszewska & Lock, 2016; Penney et al., 2015). A computer science research lab at the University of California, Santa Barbara, introduced the model of "research lab writing group," which is a group of computer science graduate students who work together to improve their writing skills in preparation for scholarly research (Doupe & Kayfetz, 2013).

Instructor advantages. Instructors can employ peer writing groups into their classrooms to help students improve critical thinking, organization, appropriateness of writing, usage, and increase the revising process (Gere & Abbott, 1985). Peer writing groups can help instructors provide ongoing feedback to students' writing during the entire writing process, not just when they turn in their papers because the instructor can spend time with each group discussing their

writing (Freedman, Greenleaf, & Sperling, 1987). In a non-writing group classroom, the instructor has little time to discuss students' writing projects each class period, so peer writing groups can help provide feedback. Peer writing groups also relieve some of the paper grading for the instructor (Gere & Abbott, 1985). Berkenkotter (1984) states additional benefits of peer writing groups that include the students learning to filter useful and non-useful feedback, practicing writing and revising for a less threatening audiences than the instructor, and of becoming aware of audience responses during the revision process. This peer influence can help writers negotiate a way between their peers' feedback and their own imperatives (Berkenkotter, 1984).

Instructor challenges. Some research indicates that peer writing groups provide too much peer-influence in a classroom and reduces the instructor's authority for classroom management (DiPardo & Freedman, 1988). Instructors may not be able to ensure that the discussions occurring among the writing groups is related to the assignment (DiPardo & Freedman, 1988).

Student advantages. When students participate in peer writing groups, they understand that writing is a social process, and that part of the writing process is to obtain feedback from peers (Smith & MacGregor, 1992). Discussing writing with other writers helps students to engage in the discourse of talking about writing, which they internalize, and helps them with language development (Gere, 1987). Writing groups also help students draft and write together, so the process of writing does not seem lonely or alienated (Spear, 1988). Research indicates that more successful writers are aware of audience needs, and peer groups can help writers who may not focus on audience, to be conscious of the audience (DiPardo & Freedman, 1988; Flower, 1979). Peers tend to have the ability to communicate more willingly with each other

than an instructor and can help peers build confidence, social skills, and motivation (DiPardo & Freedman, 1988).

Student challenges. If students in peer writing groups have little experience being a peer reviewer, the feedback they provide may not be useful to their peers' writing. Berkenkotter's early research (1984) uncovered that peer reviewers respond different to their readers based on personality, level of maturity, and ability to provide constructive feedback. She also discovered that some students asserted their propriety rights over their texts while others gained or lost their sense of authority (Berkenkotter, 1985).

Peer teaching. Peer teaching, or students of similar age and education teaching or tutoring other students, has historical roots in early American schools (Goldschmid & Goldschmid, 1976). In early schools, masters of understaffed schoolhouses asked their best students to help those with lesser abilities or slower comprehension (Goldschmid & Goldschmid, 1976). In one-room school houses, older students often taught younger ones. In 1798 Joseph Lancaster, who directed a school for the poor, was one of the first to attempt to formalize peer teaching (Goldschmid & Goldschmid, 1976). Peer teaching was introduced to higher education centuries later. The University of Berlin is reported using peer tutoring in 1951 (Goldschmid & Goldschmid, 1976). Smith and MacGregor (1992) state that peer teaching is probably the oldest form of collaborative learning.

An overview. McKeachie, Pintrich, Lin, and Smith (1986) state there is ample evidence to support that "peer teaching is extremely effective for a wide range of goals, content, and students of different levels and personalities" (p. 75). Peer teaching is defined as "the use of teaching and learning strategies in which students learn with and from each other without the immediate intervention of a teacher (Boud, Cohen, & Sampson, 1999, p. 413-414). The

theoretical foundations of peer teaching have roots in Jean Piaget's and Lev Vygotsky's learning theories. Piaget's (1985) Theory of Cognitive Development is based on having peers actively interacting with one another. Vygotsky's (1978) Sociocultural Theory of Learning is based on the active involvement of peers, adults, and instructors and how their advanced knowledge can help others gain knowledge.

There are multiple models of peer teaching. These models are based on the effect of peers on each other and active learning. Newcomb's (1974) research discovered that a student's peer group is more influential than an instructor. Students turn to other students for advice and support before using faculty advising or campus counseling services (Goldschmid & Goldschmid, 1976). Since peer teaching focuses on personal relationships, it helps satisfy a student's socio-psychological needs. Students at universities and colleges may be away from home for the first time, and their peer group can have significant influence on them. (Goldschmid & Goldschmid, 1976). Another factor that should be considered with peer teaching is the economic perspective. Since peer teaching programs use students, there is possibility for budget saving measures since students are assuming roles faculty members would traditionally play (Goldschmid & Goldschmid, 1976).

There are five main type of peer teaching models. The first model is discussion groups, seminars, or "tutoria," which are led by teaching assistants. In the United States and Europe it is common practice in large or survey lectures to supplement these lectures with a weekly seminar led by a teaching assistant, usually a graduate student (Goldschmid & Goldschmid, 1976). This seminar allows students in large courses to ask questions and receive feedback. Graduate students are used to proctor these weekly seminars since they are more economical than using a

faculty member. Also, it is believed to help graduate students gain experience for future career opportunities in academia (Goldschmid & Goldschmid, 1976).

The second type of peer teaching model is the proctor model, which is based on Fred Keller's "Keller Plan" (Keller, 1974). The proctor model uses students to teach courses instead of an instructor. While proctors work with an instructor, they work individually with students to help them master course material, administer tests, provide feedback on tests, provide feedback on the students to the instructor, and provide feedback to the instructor on the course material (Goldschmid & Goldschmid, 1976). Proctors are students who have mastered the course or subject content in previous years who in turn can provide one-on-one interaction. The proctor model requires a strong structure to be successful.

The third peer teaching model is student learning groups. Student learning groups are instructorless or self-directed student groups (Beach, 1974). In Leslie Beach's research in this area he suggests that we need to know more about how students learn from one another when they are an active member in their learning and accept responsibility for their learning (Beach, 1974). Student learning groups are groups of students who meet independently to discuss course content and get support for assignments (Goldschmid & Goldschmid, 1976).

The fourth type of peer teaching model is the learning cell. In learning cells, students work in pairs where they take turns asking and answering questions about material they both have read (Goldschmid & Goldschmid, 1976). Learning cells need to be highly structured in order to be successful. Before coming to class, students read and prepare questions. At the beginning of each class students are randomly assigned in pairs. In these pair groups, students take turns asking their questions and discussing. The instructor moves from cell to cell providing feedback and answering questions (Goldschmid & Goldschmid, 1976).

The fifth type of peer teaching is student counseling where one student is assigned to a small group of usually four to five incoming freshmen to serve as a counselor and tutor to help the incoming students adapt and succeed. The counselor/tutors met regularly with their group of students and with the professor in charge (Goldschmid & Goldschmid, 1976). This student counseling model can be seen in student learning or drop-in centers, which are often staffed by students waiting to help other students.

Instructor advantages. In peer teaching, instructors are not replaced; their roles just change. Instructors no longer lecture and serve as the sole source of information. Instead they become partners in a collaborative learning environment (Goldschmid & Goldschmid, 1976). Instructors contribute to their students' quality of learning by organizing structured peer activities, locating materials that are ideal for peer teaching environments, and guiding and assisting their students.

Instructor challenges. The selection of peer tutors in the discussion proctor, student counseling models can be a challenge for instructors. Generally, students with high academic achievement are selected into these positions. However, academic achievement does not always indicate that the student will be an effective teacher or mentor (Goldschmid & Goldschmid, 1976). For example, graduate students who are selected for these lead roles may be under stress due to their own studies or have outside obligations that may influence their abilities (Goldschmid & Goldschmid, 1976). Instructors may also have to guide and mentor the students selected to lead.

In the peer teaching models where the peers are equal, student learning groups and learning cells, there can be issues with certain students dominating the discussion or having leadership issues (Goldschmid & Goldschmid, 1976). Even though in peer teaching models

instructors may be more "hands off," they still need to provide structure around the peer teaching groups and the nature of the interactions. Instructors should incorporate peer teaching into the curriculum, which requires faculty and department involvement. This may require a new role for the instructor (Goldschmid & Goldschmid, 1976).

  Student advantages. Students who serve as peer tutors in the discussion proctor, student counseling models advance at a cognitive level from teaching, but also at an interpersonal level by building their self-esteem, which influences their perspective on learning and school (Goldschmid & Goldschmid, 1976). Peer teachers also develop awareness of students' individual and collective learning styles and reflected on how they presented material (Velez, Cano, Whittington, & Wolf, 2011).

  Students involved in all types of peer teaching also experience cognitive gain. Research indicates that students increase their problem-solving skills, retention of information, and conceptual development (Goldschmid & Goldschmid, 1976). Velez et al. (2011) report that in their research students who participate in active peer teaching displayed elements of metacognition. As stated earlier, research also indicates that a student's peer group has more influence than an instructor. Students in peer groups may feel more comfortable in asking questions to their peers than to their instructors.

  Student challenges. Students are typically taught in a passive learning environment and they may lack important skills necessary to be an active and productive member of a peer group. They made need guidance on asking the necessary questions, providing relevant and constructive feedback, engaging with the group members, and having the necessary social skills to communicate within a group environment (Goldschmid & Goldschmid, 1976).

Discussion groups. There are several theoretic frameworks that support the relationship of academic discussion and student learning (Elizabeth, Anderson, Snow, & Selman, 2012). Vygotsky's Theory of Language frames social interaction as a means to individualize children's cognitive processes by communicating. Mikhail Bakhtin's research indicates that social interaction provides learners the opportunity to collaborate to gain meaning and construct knowledge (Elizabeth et al., 2012). Bakhtin viewed discussion as an interactive educational process (Elizabeth et al., 2012). The theoretical shift in how students construct knowledge through dialogue and interactions has prompted research to explore using discussions in classrooms (Elizabeth et al., 2012).

An overview. "A significant part of both collaborative and cooperative learning is learning by participating in group discussions" (Stenlund, Jönsson, & Jonsson, 2017, p. 145). Discussion groups are informal and formal processes that encourage student dialogue with teachers and each other (Smith & MacGregor, 1992). Discussion groups are a form of group interaction where members address a question of common interest so they can exchange different points of view in order to better understand the issue (Bahar, 2003). Discussion groups talk and listen as they inquire about a shared text (topic, issue, document, etc.) and respond to a focusing question and purpose (Parker & Hess, 2001). Discussion expands individual group members' understanding and interpretation of their own life experiences and others as they gain shared understanding (Parker & Hess, 2001).

When using discussion groups in the classroom, instructors divide the class into small groups and provide a question to discuss and monitors as students exchange ideas, elaborate on their views, and try to arrive at an answer (Bahar, 2003). Instructors should select or create

questions that are open-ended and require a high level of cognitive reasoning skills to answer. The goal of discussion groups is to have students think critically and creatively (Bahar, 2003).

Parker and Hess (2001) identify three main types of discussion: deliberation, seminar, and conversation. The deliberation type of discussion aims at the group reaching a decision on a problem. A group deliberates by weighing alternative actions and deciding on which one or ones will address the problem (Parker & Hess, 2001). The second type of discussion, seminar, is intended to develop, expose, and explore meanings (Parker & Hess, 2001). Unlike deliberation discussions, seminar discussions are not aimed at deliberating options to come to a decision. Seminars are aimed at informing, clarifying, and broadening group members' perspectives and are more theoretical and existential (Parker & Hess, 2001). The last type of discussion, conversation, is talking about what a group wants to accomplish by seeking alternatives and weighing them (Parker & Hess, 2001).

Instructor advantages. Group discussions provide the instructor with feedback about student learning (Cashin & McKnight, 1989). As students engage in conversation with the instructor and each other, the instructor can gauge the depth of student understanding. Instructors can use discussions to help with higher-order cognitive learning objectives such as application, analysis, synthesis, and evaluation (Cashin & McKnight, 1989). Discussions can also help instructors teach affective objectives such as helping students to develop interests and values and to change attitudes (Cashin & McKnight, 1989). "Discussions can do more than change minds; they can change hearts, the way we feel about an issue and appreciate it" (Cashin & McKnight, 1989, p. 28).

Instructor challenges. One of the biggest challenges instructors face in group discussions is silence (Neff & Weimer, 1989). Instructors who have the best prepared questions

for group discussion cannot guarantee that students will participate in the discussion and respond. Cashin and McKnight (1989) state that preparing discussions take more forethought than preparing for lectures. Clarke (1989) suggests students complete a written assignment before each class to help prepare for the discussion. Another challenge instructors face in group discussion is evaluating or grading students on their discussion participation (Neff & Weimer, 1989). Clarke (1989) suggests that instructors clearly state in the syllabus that part of students' grades will be discussion based and outline the criteria for the discussion participation. Discussions are also more time-consuming not suited to for covering significant amounts of material (Cashin & McKnight, 1989). Instructors also have less control in discussions; instructors must go where the students' conversation takes the class (Cashin & McKnight, 1989). While there are resources for faculty to access to improve their discussion instruction techniques, Neff and Weimer (1989) state that many instructors do not read teaching outside of the disciplinary context, which can help improve instructional techniques.

Student advantages. Research indicates that students who engage in academic discussions have increased group problem-solving and reasoning skills, and experience higher levels of individual achievement (Elizabeth et al., 2012). Discussion groups also help students to connect their academic knowledge and experience to the real world (Elizabeth et al., 2012). Students in discussion groups also gain conversational skills (Elizabeth et al., 2012). Discussion groups allow students to be active participants in their own learning, which can increase their motivation to learn (Cashin & McKnight, 1989). Students who participate in discussions tend to retain information better than in a lecture environment (Ewens, 1989).

Student challenges. Some students may be more passive learners and have little experience participating in group discussions (Neff & Weimer, 1989). Students also may be

hesitant to participate in discussions due to peer pressure or being afraid of providing the wrong answer (Cashin & McKnight, 1989). Also, in some cultures it is considered inappropriate for an individual student to stand out (Cashin & McKnight, 1989).

Learning communities. Learning communities first emerged in the 1920s at the Experimental College at the University of Wisconsin (Smith, 2001). The Experimental College was founded by Alexander Meiklejohn, who was a prominent educational leader of the time. Meiklejohn, along with John Dewey, was concerned about the role of schools in a democratic society. Meiklejohn's research focused on postsecondary schools and Dewey's on K-12 (Smith, 2001). The Experimental College was created out Meiklejohn's belief that the structure of a research university was not the best way to prepare students for democratic citizenship. This emerging research university structure was creating specialized departments with an elective system, which made exploring interdisciplinary issues difficult (Smith, 2001). Meiklejohn designed the Experimental College as a two-year an interdisciplinary historical and contemporary curriculum that was team-taught and centered on Democracy (Smith, 2001). The Experimental College focused on building a community along with a seamless interface between learning and the living environment (Smith, 2001). After facing challenges and support obstacles, the Experimental College was closed after five years.

In the 1960s when the community college system was established and the higher education system doubled in size, learning communities emerged again (Smith, 2001). This era brought experiments with faculty, structure, student roles, curriculum, content, and pedagogy (Smith, 2001). During this time a student of Meiklejohn, Joseph Tussman, reinstated Meiklejohn's learning community program at the University of California-Berkley. Another learning community approach modeled after Meiklejohn's was created at San Jose State College

by Merv Cadwallader (Smith, 2001). There were also institutions on the East Coast of the United States who were developing adaptations to the learning community idea Roberta Matthews and Patrick Hill. The changes Matthews and Hill made to Meiklejohn's original learning community model opened the concept up to a broader range of postsecondary institutions. Hill was a student of Dewey and focused on restructuring teaching and learning (Smith, 2001).

When Hill became the provost at The Evergreen State College in Washington in the early 1980s, the learning community movement was joined across both coasts. Barbara Leigh Smith and Jean MacGregor lead the newly established The Washington Center at The Evergreen State College, which disseminated the idea of learning communities nationwide (Smith, 2001). The emergence of several pedagogies such as service learning, assessment, writing across the curriculum, inquiry-based approaches to the sciences, multicultural education, collaborative and cooperative learning, and problem-centered learning, over the last 15 years has added to the popularity of learning communities (Smith, 2001). According to Smith (2001), learning communities have provided broader platform for institutions to implement these pedagogies.

An overview. Learning communities support a constructivist view of knowledge because knowledge is not discovered, but is socially constructed (Zhao & Kuh, 2004; Cross, 1998). There is a wide range of definitions for learning communities from loosely structured programs where students can take common courses together to very structured programs of integrated courses team taught by faculty in different disciplines to a cohort of students who live in the residence hall (Cross, 1998). Cross (1998) defines learning communities as "groups of people engaged in intellectual interaction for the purpose of learning" (p. 4). Brower and Dettinger (1998) state that learning communities do not have to be solely based on academic curriculum.

They can also integrate academic subjects and social interactions and provide a physical space for intellectual interaction to occur (Brower & Dettinger, 1998). Brower and Dettinger (1998) also state "learning communities must be designed to develop a triad of responsibilities within students—professional, ethical, and civic" (p. 16).

Lenning and Ebbers (1999) outline four different types of learning communities: curricular, classroom, residential, and student-type. Curricular learning communities are a group of students enrolled in two or more courses connected by a common theme. Classroom learning communities occur in the classroom where cooperative learning and group activities are incorporated. Residential learning communities are where students taking two or more common courses live in close proximity of one another to encourage social interaction and intellectual engagement outside of the classroom. Student-type learning communities are for underrepresented students. According to Zhao and Kuh (2004), most learning communities incorporate active and collaborative learning to complement academic and social activities in and outside the classroom.

Instructor advantages. Learning communities provide a method for instructors (and staff) to serve a diverse student population with diverse learning styles (Smith, 2001). Smith (2001) indicates that learning communities can increase student retention and attendance (Zhao & Kuh, 2004). Learning communities also provide instructors and departments the opportunity to develop a multicultural curriculum (Smith, 2001).

Instructor challenges. While the development and support of learning communities encourages instructor and staff collaboration across different disciplines, not all instructors enjoy collaborating (Zhao & Kuh, 2004). Since learning communities require collaboration and resources, this can be a source of weakness. Learning communities requite leadership structures,

resource investments, faculty development, curriculum integration, and pedagogical change, which may pose challenges to budgets, people, and resources (Smith, 2001).

Student advantages. Learning communities help students make connections between ideas in different disciplines, and help students gain social interactions by being with the same students over a period of time (Zhao & Kuh, 2004). Students who participate in learning communities interact with peers of different cultural and disciplinary backgrounds and gain a different perspective to think differently (Zhao & Kuh, 2004). Zhao and Kuh's (2004) research indicates that students who participate in learning communities have positive academic performance, are engaged in educational activities (including engagement with faculty and active and collaborative learning), have positive attendance, and are overall satisfied with their college experience. Students involved in learning communities have positive gains in personal and social development as well (Zhao & Kuh, 2004).

Student challenges. While learning communities encourage interaction, some students do not like the concept of cooperative learning (Zhao & Kuh, 2004). Research indicates that some learning communities are more effective than others (Lenning & Ebbers, 1999), which can influence students' experiences. Zhao and Kuh's (2004) research found that men, transfer students and part-time students are less likely to participate in a learning community. These student populations may not experience the benefits learning communities can offer.

Agile. Agile techniques have been used by software developers since the 1960s (Williams & Cockburn, 2003). However, Henry Ford applied Agile elements to manufacturing, now known as lean manufacturing, as early as 1922 (Cooke, 2010). Lean manufacturing focuses on eliminating wastes that add little value to business processes (Cooke, 2010). Agile was brought to the forefront in February 2001 at Utah ski resort when 17 people met to discuss

alternatives to software development. This group of people were independent thinkers and some

of them competitors, and they represented a variety of software development processes such as

Extreme Programming, Crystal, Pragmatic Programming, SCRUM, and DSDM and wanted to

find a solution to the industry standard of a documentation driven, heavyweight software

development process (Beck et al., 2001). It is important to mention the 17 people who signed the

Agile Manifesto, since some of them are cited in this research. They are: Kent Beck, Mike

Beedle, Arie van Bennekum, Alistair Cockburn, Ward Cunningham, Martin Fowler, James

Grenning, Jim Highsmith, Andrew Hunt, Ron Jeffries, Jon Kern, Brian Marick, Robert C.

Martin, Steve Mellor, Ken Schwaber, Jeff Sutherland, and Dave Thomas (Beck et al., 2001).

Before Agile became mainstream, the "waterfall" method of software development was

the dominant process being used to manage how software teams created software. Waterfall

methodology created detailed requirement and execution plans (documentation) at the beginning

of the project and were passed from function to function (Rigby, Sutherland & Takeuchi, 2016).

The waterfall approach is successful in stable industry sectors, but not when software markets

began to change rapidly and unpredictably (Rigby et al., 2016). In a market, such as software

were change is rapid and sometimes daily, product specifications that were identified at the

beginning of the project were outdated by the time the software was delivered to customers. It is

difficult to identify all the requirements for a project at the beginning and then expect the results

to meet the customer's needs months later. Software engineers or developers felt oppressed by

the bureaucratic procedures in the waterfall methodology because they are not able to make

changes to their design (Rigby et al., 2016). This is why the group of 17 met in Utah for a

weekend—they wanted to bring change to how software projects were managed. This group

wrote the "Manifesto for Agile Software Development" or "Agile Manifesto" and named

themselves the "Agile Alliance" (Beck et al., 2001). Martin Fowler is credited with suggesting the word "Agile" (Beck et al., 2001). Development frameworks that follow the values and principles outlined in the Agile Manifesto are known as Agile techniques (Rigby et al., 2016). In the Agile Manifesto, there are four values and 12 principles. The four main values are: individuals and interactions over processes and tools, working software over comprehensive documentation, customer collaboration over contract negotiation, and responding to change over following a plan (Beck et al., 2001). Jim Highsmith, one of the original Agile Manifesto signers, recommends replacing the word "software" with "product" to make the Manifesto values and principles valid to other industry sectors outside of the computer software sector (Cockburn, 2006). Rigby, Sutherland (an original Agile Alliance member), and Takeuchi (2016) provide an explanation of each of the four values, which are paraphrased here.

The first Agile value, "people over processes and tools" reflects that individual team members and teams should be trusted to complete the work they have been assigned and have the support they need to complete the work. This support could be in terms of tools, knowledge, upper management, and resources. Team environments should be fun, encourage creative problem solving, and should maintain a sustainable pace. Team members should communicate face-to-face to improve their work environment and management should remove impediments that may prevent successful collaboration (Rigby et al., 2016). In traditional waterfall development, team members were assigned their work and did not regularly communicate with other teammates or the customer. Team members usually have to go through their manager or designated organizational structure to get information.

The second Agile value, "working prototypes over excessive documentation" counters one of the major issue the Agile Alliance has with the waterfall method—excessive

documentation. This value highlights that traditional predictions and plans of project management are a "waste of time and money" (Rigby et al., 2016, Agile Values and Principles, para 3). Agile teams should produce a minimal marketable product that is a working prototype a customer can view instead of large amounts of technical documentation explaining the product. Engaging the customer in a conversation about a prototype will yield more valuable feedback then reading what the customer wrote in the requirements document. Teams who can see the results of their work by creating a working prototype, learn faster, are happier, stay longer, and produce more valuable work. This means that teams should experiment on small increments of the work they have created by showing it to a customer and getting feedback and then making changes based on the feedback (Rigby et al., 2016).

The third Agile value, "responding to change rather than following a plan," represents that Agile teams should have a vision and a plan, and should only plan the tasks that will not change by the time they start working on them. Team members should embrace changes in direction because these changes bring them closer to the customer and bring better results (Rigby et al., 2016). An Agile team's project schedule or plan should be fluid and change as the project changes.

The fourth value, "customer collaboration over rigid contracts," encourages Agile teams to collaborate with customers instead of relying on the text in a written contract. Specifications should evolve throughout the project because customers rarely know what they want at the beginning. As an Agile team shows a customer their progress, the customer will be able to articulate what they want and do not want (Rigby et al., 2016).

The Agile Manifesto also lists the 12 Agile principles Agile teams and projects should use as guidelines. The 12 Agile principles are listed here taken directly from the Agile Manifesto (Beck et al., 2001):

- Our highest priority is to satisfy the customer through early and continuous delivery of valuable software.

- Welcome changing requirements, even late in development. Agile processes harness change for the customer's competitive advantage.

- Deliver working software frequently, from a couple of weeks to a couple of months, with a preference to the shorter timescale.

- Business people and developers must work together daily throughout the project.

- Build projects around motivated individuals. Give them the environment and support they need, and trust them to get the job done.

- The most efficient and effective method of conveying information to and within a development team is face-to-face conversation.

- Working software is the primary measure of progress.

- Agile processes promote sustainable development. The sponsors, developers, and users should be able to maintain a constant pace indefinitely.

- Continuous attention to technical excellence and good design enhances agility.

- Simplicity--the art of maximizing the amount of work not done--is essential.

- The best architectures, requirements, and designs emerge from self-organizing teams.

- At regular intervals, the team reflects on how to become more effective, then tunes and adjusts its behavior accordingly.

In *Agile Software Development: The Cooperative Game* (2006), Cockburn recounts his experience in Utah writing the Agile Manifesto with the other 16 people. As he tells the story from his perspective, he mentions two qualities that were very significant about the group of people. He says that the group had "enormous trust" (Cockburn, 2006, p. 382). Even though there were many senior level people in the room, no one tried to control the meeting. Everyone listened closely to whomever was speaking. The second quality Cockburn observed was self-organization (Cockburn, 2006). He observed that no one person tried to run the meeting even though this was the first time most of the members had met. As they were discussing a possible new approach to software development, two words emerged as the top two names to call their new concept: Agile and adaptive (Cockburn, 2006). After they settled on "Agile," they wrote the four values and then the 12 principles. As Cockburn reflects on how this group was able to accomplish so much in just a few days, the answer was clear: "We had paid attention to individuals and interactions, we had worked face-to-face, we had worked collaboratively, we had focused on our product. In other words, we had just lived what we had just written" (Cockburn, 2006, p. 384).

While Agile methods are considered mainstream in the computer software industry sector, there is evidence that Agile is expanding into other sectors. Stavru (2014) conducted a study of nine industry surveys published between 2011 and 2012 on the popularity of Agile methods. While his research indicates that the surveys he reviewed are non-scientific in nature, he reports six pieces of evidence indicating Agile is moving into the mainstream. The first indication is an increase in research on Agile software development evident by the number of publications, conferences, workshops, etc. The second indication is a significant increase in the professional body of Agile literature. Thirdly, there are active professional Agile communities

that are organizing conferences, workshops, and camps across the globe. Fourthly, there is an increase in the number of success stories about Agile adoption from some of the largest organizations in the world (Google, IBM, SAP, Microsoft, Apple, Siemens). A fifth indication is an increase in the number of traditional and conservative organizations which are favoring Agile methods. Lastly, the Project Management Institute is now certifying Agile project managers (Starvu, 2014).

An overview. Stellman and Greene (2014) define Agile as: "A set of methods and methodologies that help your team to think more effectively, work more efficiently, and make better decisions" (p. 2). Agile is also a mindset because teams must have the right mindset to apply the Agile values and principles in the most effective manner (Stellman & Greene, 2014). The Agile process is characterized by user stories, prioritization and estimating, product backlog, iterations, release planning, daily stand-ups, retrospectives, showcases, and velocity (LeanDog, 2015). There is not a single Agile model, but many models that embrace the Agile values and principles of the Agile Manifesto. Three prominent Agile approaches in the Information Technology (IT) sector are Scrum, Dynamic Systems Development Method (DSDM), Feature-Driven Development (FDD), and eXtreme Programming (XP) (Cooke, 2010).

Scrum is an iterative project management approach often used to manage software development projects. However, the Scrum framework can be used for any project-based work (Cooke, 2010). Scrum helps Agile teams to identify and prioritize work, and then commit to completing a certain amount of that work during an iteration or sprint, which is normally 2-4 weeks long (Cooke, 2010).

The key roles in the Scrum framework are the Product Owner, the Scrum Team, and the ScrumMaster. The Product Owner represents the needs of the business and is responsible for

capturing the high-level requirements of the project into a backlog. The Scrum Team is a cross-functional team that takes on the required work in each sprint cycle. The ScrumMaster facilitates the Scrum Team's work, helps to remove impediments, and helps to ensure Scrum practices are being followed (Cooke, 2010). The Scrum Team and ScrumMaster work with the Product Owner to receive input on priorities and requirements.

The key activities in a Scrum sprint are the planning meeting, daily stand-ups, the sprint review, and retrospective. The planning meeting is held at the beginning of each sprint and the Product Owner, Scrum Team, and Scrum Master review the highest priority items in the backlog and determine what will be worked on during the upcoming sprint. The daily stand-up is a daily 15-minute meeting where each Scrum Team member answers three questions: "What did I do yesterday," What am I doing today," and "What blocker/issues are keeping me from working?" These questions help the Scrum Team to be accountable to one another, highlight impediments or blockers, so the ScrumMaster can help remove them, and share knowledge.

The sprint review occurs at the end of each sprint and allows a Scrum Team to demonstrate to the Product Owner and/or customer the work they achieved during the sprint. A sprint review allows for the Scrum Team to receive feedback on their product and communicate with the customer. Feedback received during a sprint review helps to reduce the risk of the finished product not meeting customer requirements, since the customer has been involved during the entire build process.

The retrospective occurs last and is the continuous improvement aspect of Scrum. A Scrum Team meets to discuss what went well, what did not go well, and what needs changed in order to improve their processes and output. This meeting should be a safe environment so

Scrum Team members can talk opening about what worked and what did. The team then votes on what items discussed during the retrospective should be changed for the upcoming sprint.

Dynamic Systems Development Method (DSDM) is another iterative Agile approach that has roots in Rapid Application Development (RAD). DSDM focuses on building prototypes and confirming the feasibility of the project before starting full development activities (Cooke, 2010). The core objective of DSDM is to deliver high business value in iterative cycles.

The key activities in DSDM reflect the Agile way of thinking. For example, DSDM supports active user involvement throughout the process, iterative development, frequent delivery of tangible outputs, frequent testing and quality control, and empowering the team (Cooke, 2010). DSDM requires artifacts to be developed at the different stages of the project to help ensure the work is aligned with the business objectives (Cooke, 2010). DSDM has a highly structured framework and requires proposed work to be documented and confirmed before moving to the next stage is permitted (Cooke, 2010).

Feature-Driven Development (FDD) is an activity-specific Agile method used in software development. However, features of FDD could provide successful delivery of any project (Cooke, 2010). The main focus of FDD is to provide incremental value to the customer or business by delivering complete working products at the end of each iteration (Cooke, 2010). FDD is structured to have proposed systems modeled and then divided up into smaller tasks that can be completed within an iteration. After these completed projects are delivered, they are tested and then incorporated into the bigger system or project (Cooke, 2010). FDD encourages quality control by having multiple team members work on the same set of tasks and peer reviewing each other's work.

Key activities of FDD that are Agile in nature and can be applied to many business sectors. FDD activities encourage teams to have manageable workloads within a fixed time frame, have a dedicated set of peers to provide multiple perspectives, have context for work so teams know how their work fits into the overall objectives for the project, and have objectives that teams can measure their progress against (Cooke, 2010).

Similar to FDD, eXtreme Programming (XP) is an Agile method specific to software development, but also has values that are applicable to other business sectors. XP has three key focus areas: to have teams deliver the simplest solution that meets the project objectives, to anticipate change once the customer or stakeholder works with the delivered project, and to encourage the continuous improvement of the project based on feedback (Cooke, 2010). XP does not support heavy documentation and maintains requirements at a high level.

XP supports the four key values of communications, simplicity, feedback, and courage (Beck, 1999). The four basic activities of XP are coding, testing, listening, and debugging (Beck, 1999). There are a few key activities that are unique to XP. First, is the concept called Test-Driven Development (TDD), which encourages software development teams to create the tests they will test their software against before they begin development (Cooke, 2010). This is a quality management approach which allows team members to define how they will measure their success before work begins. The second unique characteristic of FDD is the concept called refactoring, which allows a team to continuously review a project they are working on and make changes to it, so future changes can be implemented more easily. Along with refactoring is the license for a team to completely throw away any software and replace it with software that provides greater value and flexibility (Cooke, 2010). XP supports the idea that the short-term loss of work outweighs the opportunity for future growth.

Agile benefits. When compared to traditional project management approaches, Agile offers multiple benefits (Rigby et al., 2016). Agile increases productivity and employee satisfaction, and reduces redundant meetings, repetitive planning, excessive documentation, quality defects, and low-value product features (Rigby et al., 2016). Since Agile encourages collaboration and consistent communication with customers, this increases a customer's visibility into the project. This increased visibility helps a team to continually adapt to a customer's changing priorities and respond to any outside influences, which improves customer satisfaction, helps a team to develop and bring valuable products to the market faster, and reduces risk of developing a product that a customer does not want (Rigby et al., 2016). According to Rigby, Sutherland, and Takeuchi (2016), engaging team members from multiple disciplines and backgrounds as collaborative peers on an Agile team broadens organizational experience and builds mutual trust and respect. Cooke (2010) lists 11 benefits of Agile: manage controllable risk, responsive planning, frequent and continuous value, direct stakeholder engagement, regular face-to-face communication, minimizing waste, tangible outputs, empowering teams, quality by design, minimal start-up costs, and initial and ongoing returns.

Agile controls risk for companies because it helps companies plan and respond to external and internal changes. Responsive planning helps organizations to commit small amounts of resources to a project and make adjustments as needed. In Agile iterations, a workable solution or deliverable is produced, which adds frequent and continuous value of the business. Agile's value of engaging directly with stakeholders helps to reduce risk and increase customer satisfaction by knowing what the customer wants and making any adjustments as the project progresses instead of at the end. Agile encourages team to have regular face-to-face communication helps team members to be informed about their work. Minimizing waste is

another benefit by minimizing up-front commitments and having teams over-produce work. Working in iterative cycles where a tangible output is required at the end of each cycle, provides significant business value while measuring the ongoing costs to determine viability. Agile teams are empowered and have high levels of self-satisfaction and motivation. Teams can see the results of their work at the end of each iteration and can engage with stakeholders about their work. Agile processes have checkpoints in place throughout the development process, which mitigates risk and helps team to produce quality products. Agile has minimal implementation costs because Agile values, principles, and practices are available and teams do not necessarily have to attend training to practice an Agile approach. Agile approaches illustrate initial and ongoing returns by having more efficient business processes, reduced overheard, increased customer satisfaction, a stronger competitive advantage, and higher employee retention rates (Cooke, 2010). Agile also supports continuous improvement and reflection on how teams work together so they can work more efficiently together (Cooke, 2010).

Agile in education. While Agile thinking and practices are found at the PK-12 and postsecondary systems, Agile has a stronger presence in the PK-12 system. One Agile success story is about a failing high school. In 2014, a failing "at-risk" high school with the perhaps naively aspirational name "Hope High," faced possible closure. The school board hired a new principal, who joined forces with the new CEO of their parent organization and they implemented an Agile learning environment. Miller (2015) indicates that two years later Hope High now has test scores that have skyrocketed on state assessments and benchmarks, and the fighting among students and classroom disruptions have been reduced. One of the education manifestos discussed in this chapter is based in PK-12.

There is a group called Agile Schools in Australia who is a group of Agile practitioners and advisors who assist schools and school systems in implementing Agile practices to help improve teams, teacher learning, and practice (Agile Schools, n.d.). Their methods are used by schools across Australia, Asia, North America and the Middle East. In the Netherlands, Willy Wijnands and Arno Delhij founded an organization called Agile in Education. Their Scrum-based process helps schools and educators to adopt Agile. Wijnands states:

> I give the students ownership of their own learning process, but most important trust. The students take their responsibility for what they do and I give them liberty and pace. The effect is that students are engaged, more productive and their results are better; It is such a wonderful to see them developing themselves! (eduScrum, n.d.)

At a postsecondary level, much research exists on using Agile in software development and technical courses. Agile is being explored and used in other discipline areas. Research exists on Scrum being used in professional writing, publishing, grant writing communication, chemistry, and digital media studies classes (Pope-Ruark, 2012, 2015; Piunno et al., 2014; Wilson, Brown, & Burke, 2013). Pope-Ruark (2012, 2015) uses Scrum in her professional communication courses to facilitate collaboration. "In my experience, using Scrum to frame complex group projects encourages trust, engagement and accountability among students, while also promoting the learned behaviors of professionalism and reflective practice" (Pope-Ruark, 2012, p. 168).

Research exists on the benefit of using Agile in higher education courses. Krehbiel et al., (2017) report that the Agile practice of team chartering/social contracts helps to establish a collaborative classroom environment where students are comfortable sharing and participating in discussions. In teacher education, an Agile-practicing professor uses the Agile practice of

showcases in her phonics course (Krehbiel et al., 2017). Students provided feedback that Agile

showcases helps them to validate their current work and receive timely feedback. The instructor

reported that Agile showcases decreases the likelihood of students not being accountable for

their work since an Agile showcase requires each student to demonstrate their work thus far on a

project (Krehbiel, et al., 2017).

To track how Agile is moving into education, there is a methodology for Agile teaching

or instruction, several Agile education manifestos, an Agile manifesto for teaching and learning,

and a mapping of Agile principles into the classroom that model the values of the original Agile

Manifesto. Andy Hon Wai Chun (2004) developed the Agile Teaching/Learning Methodology

(ATLM) in 2004 as a systematic approach to teaching/learning in higher education based on the

best practices from the computer software discipline and Agile software methodologies. Chun

states that other disciplines besides computer science share the some of the same

teaching/learning objectives that ATLM promotes (Chun, 2004). The three key characteristics of

ATLM are agility, extreme, and independence (Chun, 2004). Chun (2004) states that there are

parallels between Agile software development and teaching and learning:

> Agile Teaching/Learning Methodology values students/teachers and their interactions
>
> rather than a particular approach to teaching/learning, working knowledge rather than
>
> rote-learning, communication rather than negotiation, and responding to changes rather
>
> than just following a schedule. ATLM emphasized teacher student communication and
>
> stresses the importance of being self-adaptive to cater to changing needs. (Chun, 2004, p.
>
> 12)

When searching an academic database for articles on Agile education manifestos, only

one result is returned, which is Venkatesh Kamut's Agile manifesto for higher education.

However, there are several Agile education manifestos that currently exist. In the PK-12 sector, Steve Peha, President of Teaching That Makes Sense, has outlined the Agile schools manifesto and 12 principles of Agile schools (Peha, 2011). Peha specializes in literacy, assessment, and school leadership, and taught in thousands of classrooms and hundreds of schools across the United States and Canada. Prior to that he was a software entrepreneur and technologist. He is also a member of The National Journal Education Experts Blog. His bi-weekly column, The Effective Learning Series, won the 2001 Innovators in Education Award from the Newspaper Association of America. Peha not only has a strong educational background, but also experience in the software industry. Peha states that there is not a "scalable, replicable, well-documented, and research-proven methodology for running an existing school, starting a new school, or resurrecting a failed school" (2011). He states that perhaps Agile could be this methodology (2011, June 28). During his studying and adapting of Agile for use in schools, Peha says that Agile practices and principles translate easy to education (2011). Peha states "Agile is fundamentally about learning, people, and change – three things we struggle with in education and handle poorly at the present time" (2011). He even states "how perfectly-suited Agile is for running schools" (2011). Modeling the Agile Manifesto, Peha (2011) proposes the Agile Schools Manifesto:

- Individuals and interactions over processes and tools;
- Meaningful learning over the measurement of learning;
- Stakeholder collaboration over constant negotiation;
- Responding to change over following a plan.

Peha's Agile Schools Manifesto puts staff and students before school processes and tools (software, etc.,), prioritizes learning over assessment, seeks active collaboration and

communication with stakeholders over strictly or solely working from a contract, and responding to change and events as opposed to following the proper process in place.

According to Peha, all school leaders face competing priorities, and the Agile Schools Manifesto helps to set priorities so educators can make better choices (Peha, 2011). Peha states: "Agile provides a manageable set of proven principles that inform the culture and behavior of organizations interested in extraordinary results using lightweight approaches that solve significant problems in unpredictable environments" (2011). Along with the Agile Schools Manifesto, Peha also developed the Twelve Principles of Agile Schools, which mirrors the 12 Agile principles of the original Agile Manifesto. He developed these so principals and educational leaders would have a "set of proven principles that inform the culture and behavior of organizations interested in extraordinary results using lightweight approaches that solve significant problems in unpredictable environments" (2011).

In 2012 Venktesh Kamat published the Agile Manifesto for Education. He explains that in software development, the need for collaboration between the software development team and the customer is understood. However, in higher education the focus on the customer is often missing (Kamat, 2012). While academic products should add value to students, there is a lack of collaboration between students and higher education institutions (Kamat, 2012). While his work addresses his specific university and engineering programs, Kamat developed the Agile Manifesto for Education as a set of guiding principles to follow when there is conflict of interest between stakeholders in practicing Agile in education:

- Teachers and students over administration and infrastructure;
- Competence and collaboration over compliance and competition;
- Employability and marketability over syllabus and marks;

- Attitude and learning skills over aptitude and degree (Kamat, 2012, p. 231).

Similar to the Agile Manifesto, the items on the left side of the above bullet points (the phrases before the word "over") have more value than the items on the right. Kamat states that using the values in the Agile Manifesto for Education will bring more quality and productivity to higher education (Kamat, 2012).

In Agile one of the most important concepts is continuous feedback. By reflecting on and learning from a current iteration, changes can be made to try and improve the next iteration. There is no concept of "best practices" because better and better practices keep evolving from iteration to iteration (Kamat, 2012). This concept can allow educators and administrators to realize areas of opportunity and address them sooner rather than later.

Not only does Agile have benefits for instructors and administrators. Kamat (2012) also believes that "early exposure to Agile learning environment can help the students to make a smooth transition to workplace environments" (p. 232).

A white paper by Karl Royle and Jasmina Nikolic discussing an Agile Pedagogy Manifesto is indexed in ResearchGate. They propose a pedagogic method rooted in Agile, mainly Scrum, that can be aligned with teaching and learning (Royle & Nikolic, 2016). The development of an Agile pedagogical approach can lead to: "greater agency for both learners and teachers; the purposeful integration of digital tools into practice; and the development of human capability and functioning through a change in learning design" (Royle & Nikolic, 2016, p. 2). Education does not have a pedagogical approach to responding to constant change. According to Royle and Nikolic (2016), education must recognize and respond to change and help students who are adaptable, motivated learners. They believe in adopting a pedagogy where Agile educators focus on developing useful knowledge and skills rather than detailed lesson plans,

having a supportive and collaborative approach, and incorporating a reflective review process

(Royle & Nikolic, 2016). Their proposed Agile Pedagogy Manifesto is:

- Practice preferred to theory;

- Learner choice and agency preferred to learners being limited and controlled;

- Learning and applying skills preferred to learning facts;

- Collaboration preferred to competition;

- Customized learning preferred to standardized one size fits all;

- Co-constructed learning preferred to teacher led (Royle & Nikolic, 2016, p. 22).

An Agile faculty learning community at Miami University recently published a

Manifesto for Teaching and Learning (Krehbiel et al., 2017). They believe that the key to

successful application of Agile in higher education is by prioritizing the day-to-day values that

guide the daily work of administrators, faculty, and staff (Krehbiel et al., 2017). Their Manifesto

for Teaching and Learning outlines that faculty across all disciplines and subjects should guide

their work by these six key values:

- Adaptability over prescriptive teaching methods;

- Collaboration over individual accomplishments;

- Achievement of learning outcomes over student testing and assessment;

- Student-driven inquiry over classroom lecturing;

- Demonstration and application over accumulation of information;

- Continuous improvement over the maintenance of current practices (Krehbiel et al.,

  2017, p. 96).

In 2009 a group of researchers from Pace University's Seidenberg School of CSIS

presented their findings on student-faculty research day regarding Agile principles in active and

cooperative learning (Stewart, DeCusatis, Kidder, Massi, & Kirk, 2009). They summarize several studies in the computer science discipline where Agile enhanced the learning environment, increased student motivation, increased course satisfaction for both the instructor and student, and provided a mechanism for active student feedback for the instructor so the instructor could adapt (Stewart et al., 2009). The researchers state that at the time they performed the study, they could not locate any specific studies on the use of Agile methods in education or teaching or the application of Agile principles in non-computer science courses at the post-secondary level (Stewart et al., 2009). Besides the few studies referenced in this paper, not much research has been added regarding Agile in non-computer science courses since 2009.

However, Stewart et al. (2009) explore how active and cooperative learning is more effective than individual learning because "when students are actively engaged in the college experience, learning and retention are more likely (Stewart et al., 2009, p. B3.4). They reference Chickering and Gamson's 1987 study that outlined seven principles for good practice in postsecondary graduation. Five of these seven principles were faculty policies:

- Encouraging cooperation among students;

- Encouraging active learning;

- Communicating high expectations;

- Encouraging contact between students and faculty;

- Using active learning techniques (Stewart et al., 2009, p. B3.4).

Stewart et al. (2009) summarize that increased interaction between faculty and students can influence the likelihood of student engagement and success. One way to increase faculty and student interaction is Agile. The researchers modeled the four original Agile Manifesto values and developed the Agile Pedagogy:

- Students over traditional processes and tools;

- Working projects over comprehensive documentation;

- Student and instructor collaboration over rigid course syllabi;

- Responding to feedback rather than following a plan (Stewart et al., 2009, p. B3.5).

Stewart et al. (2009) also map the 12 Agile principles to the classroom environment. While this lengthy mapping will not be reprinted in this paper, it illustrates that Agile is directly related to classroom teaching and learning. In their research, Stewart et al. (2009) outline the parallels between Agile and active and cooperative learning. Both Agile and active and cooperative learning approaches place the value on the interaction between the instructor and students. The Agile teaching pedagogy Stewart et al. (2009) propose encourages student questions and provides a feedback process for the instructor to address them. Agile curriculum is both small and large project based where the emphasis is on the students' collaborative learning experiences not on the lecture. This approach allows instructors and students to work closely together and allows instructors to be flexible and respond to students' needs (Stewart et al., 2009). "While Agile methods are clearly active and cooperative, a case may be made that many active and cooperative learning techniques are also Agile" (Stewart et al., 2009, p. B3.4).

Summary

This literature review has established constructivist epistemology as the foundation for collaborative learning. After a brief overview of constructive epistemology, this literature review evaluated collaborative learning, the main types of collaborative learning, including advantages and disadvantages for both instructors and students, provided an overview of Agile, and provided a survey of Agile research in postsecondary education. A review of collaborative learning and Agile literature illustrates there are similar benefits for both instructors and students

when working in collaborative or Agile environments. The results of the literature review also indicate the need for additional research for how Agile is being used in non-computer science disciplines to enhance collaborative learning experiences in the postsecondary classroom.

Chapter III: Method and Procedures

The key focus of this qualitative narrative research was to collect first-hand written accounts of postsecondary faculty using Agile in their classrooms to influence collaborative learning. Narrative research can be incredibly beneficial in the field of education by helping to increase the understanding of issues related to teaching and learning by telling and retelling teachers' stories (Gay et al., 2009). Sometimes educational issues cannot be understood with statistical data; narrative research allows for the voice of the practitioner to be heard and validated (Gay et al., 2009). Narrative research is also a collaborative process since the researcher and the research participant collaboratively tell a story about an experience (Gay et al., 2009). Agile is collaborative in nature since it is practiced by teams of people, which seemed fitting for narrative research. In addition to gathering narrative accounts, information was collected from the participants to ascertain their perspectives about whether using Agile practices provided students with the transferable skills graduates are lacking, which are: critical thinking and problem-solving skills, the ability to pay attention to detail, polished communication skills, leadership qualities, and interpersonal and teamwork skills (Strauss, 2016). This study collected first-hand accounts of instructors' own experiences and observations with using Agile in the postsecondary classroom.

According to Gay et al. (2009), using a narrative research approach is increasing in the discipline of education. One factor that has influenced this trend is the emphasis on "teacher reflection, teacher research, action research, and self-study (Gay et al., 2009, p. 384). This study used a narrative approach to collect qualitative data from postsecondary instructors who reflect on how Agile practices in their classrooms influences collaboration and soft skills, and what they have learned from their own action research by using Agile in their classroom for collaboration

purposes. This study used interviews to collect feedback from a small number of postsecondary Agile instructors at one public Midwest university. Through these interviews, the researcher collected information in order to tell the stories of Agile faculty to uncover their perceptions about using Agile in postsecondary education.

The study aimed to collect narrative text from practicing Agile postsecondary instructors to answer the research questions, and to inform other instructors about Agile. This study aimed to tell the stories of practicing postsecondary Agile faculty to uncover their perceptions about using Agile in postsecondary education, to explore if using Agile influences collaboration, and to collect perceptions if Agile influences transferable skills. The following research questions guided this study:

1) How do instructors begin using Agile in their postsecondary classrooms?

2) What Agile practices are instructors using in classroom instruction for collaborative learning?

3) How does Agile influence collaborative learning in the classroom?

4) How do instructors perceive Agile to develop students' soft skills such as, critical thinking, problem solving, attention to detail, communication skills, leadership abilities, interpersonal, and teamwork?

Research Methodology

A main principle of Agile is continuous improvement (reflection on the process), which occurs in the form of retrospective meetings at the end of an iterative cycle. Continuous improvement helps Agile teams and agilists to reflect on what is working well and what is not. It is an opportunity for team members to provide their input and hear everyone's feedback about how the team is working. This process allows teams to make changes and discuss how to

improve practices. Qualitative inquiry has self-reflective perspectives (Creswell, 2003; Rossman & Rallis, 1998). Qualitative research uses data collection methods that are interactive, humanistic, and innovative (Creswell, 2003; Rossman & Rallis, 1998). Data collection methods for qualitative research are expanding beyond observations and interviews to documents, sounds, and other electronic mediums. Qualitative research is also emergent and adaptable (Creswell, 2003; Rossman & Rallis, 1998), much like Agile. Agile allows for change and adaptability based on reflection and feedback.

Another characteristic of qualitative research is that it takes place in the natural setting (Creswell, 2003; Rossman & Rallis, 1998). Interviews were conducted at the university where each participant teaches. This allowed the researcher to make observations about the participant's office—books on the shelves, pictures on the wall—and capture the faculty's voice and facial expressions as they discussed Agile. According to Clandinin and Connelly (2000, p. 20), "Narrative inquiry is a way of understanding experience. It is a collaboration between researcher and participants, over time, in a place or series of places, and social interaction with milieus." This research aimed to understand and retell each participant's experience with Agile in their classroom. Each participant's Agile story was told through the interview, and a narrative analysis describing the interview atmosphere set the stage for the story. The telling of stories blends connected with the interpretive nature of qualitative research (Creswell, 2003; Rossman & Rallis, 1998). The narrative interviews were analyzed to uncover themes and draw thematic or theoretical conclusions about the meaning of the interview transcriptions.

Qualitative researchers seek to view social phenomena holistically and not provide a micro-analysis of their topic (Creswell, 2003; Rossman & Rallis, 1998). The research provided insight to the phenomenon of Agile and provided different views of how postsecondary

educators use Agile in their classrooms. Participants in this research study were from a variety of disciplines to provide this broad view and perspective.

Another aspect of qualitative research is that it uses iterative inductive and deductive reasoning (Creswell, 2003; Rossman & Rallis, 1998). Qualitative researchers work in iterative cycles as they repeatedly revisit the data. Iteration is a key element in Agile because it allows teams to frequently receive feedback on their work, reflect on their work, incorporate continuous improvement, and implement any necessary changes. For example, an Agile project team in a class may work in one-week iterations on their project. At the end of each week, they get feedback on their work from their professor, have a retrospective where they discuss what is going well, what is not going well, and what they need to change. They take all this feedback, incorporate continuous improvement, and go to work the next week. This allows a team to be more efficient the longer they work together and do work that is meaningful. Working in iterations helps Agile teams to get feedback on their work, change direction quickly if needed, and reflect on how they work together as a team.

Qualitative narrative inquiry is rooted in theory from John Dewey, but also parallels Agile. Education is a continuum about experience and learning from both a student and instructor perspective. John Dewey believed that "examining experience is the key to education" (Clandinin & Connelly, 2000, p. xiii). According to Clandinin and Connelly (2000), educators are interested in life, and according to Dewey, education is life, and education, experience and life are intertwined. Dewey believed that experiences grow out of other experiences and experiences lead to future experiences, and this continuum is true about education and learning (Clandinin & Connelly, 2000). Students use past experiences as a base to lead to future experiences and learning. In order to study education, one must study experience (Clandinin &

Connelly, 2000). Educators are interested in life and in learning and teaching and how learning and teaching takes place (Clandinin & Connelly, 2000). A principle of Agile is reflection and continuous improvement at regular intervals, which complements Dewey's continuum where experiences grow out of other experiences. Educators must continually reflect on their teaching and students must reflect on their learning.

The social sciences were founded on the study of experience; and therefore, experience is the beginning for all social science inquiry (Clandinin & Connelly, 2000). Narrative inquiry is a method to understand experience—the experience of people (Clandinin & Connelly, 2000). Studying the experience of how postsecondary instructors use Agile in their postsecondary courses can create new knowledge in teaching and learning.

According to Mertler (2015), narrative research is a methodological approach to conducting qualitative research in order to convey experiences as they are expressed in the lived and told stories of individuals. In narrative research, a spoken or written account of an event or action is captured (Mertler, 2015). A narrative researcher usually focuses the stories of one or two individuals, and then gathers data from their stories, which reflect their experience, and then the events are chronologically ordered. When narrative research is conducted in the field of education it is used to increase understanding of issues related to teaching and learning by telling and retelling teachers' stories (Mertler, 2015; Gay et al., 2009).

According to Gay et al. (2009. p. 384), narrative research in education is influenced by: The increased emphasis in the past 15 years on teacher reflection, teacher research, action research, and self-study; the increased emphasis on teacher knowledge—for example, what teachers know, how they think, how they develop professionally, and how they make decisions in the classroom; the increased emphasis on empowering teachers by

giving them the voices in the educational research process through collaborative educational research efforts.

The researcher selected narrative research to collect personal accounts of how postsecondary faculty use Agile in their classroom to influence collaborative learning and the development of transferable skills. The researcher wanted to tell the stories of Agile educators so other educators can learn about Agile and reflect on how it may be applicable to their classrooms. "A valid and clear narrative should increase our collective understanding of the phenomenon under study" (Gay et al., 2009, p. 389).

Subject Selection and Description

In narrative research, it is common practice to have one or two participants, and the researcher reflects on who to invite to the study (Creswell, 2007). For the purpose of this research study, three participants were selected all of who were known to the researcher. These participants were postsecondary full-time faculty at a public four-year university in the Midwest of the United States. Each participant represented a different college at the University in order to increase diversity of responses. All three participants completed Introductory and Advanced Agile Faculty Workshops and obtained their ICAgile Professional license. All participants have been using Agile in their classrooms for at least one academic year. All participants in the study were given pseudonyms to maintain their privacy and protect their identities based on current ethical research protocols.

Participant A, known by the pseudonym "Kyle," has a Ph.D. and was an assistant professor in the College of Liberal Arts & Applied Sciences. Kyle has been using Agile in his courses for one year.

Participant B, known by the pseudonym "Mel," has a Ph.D. and was a faculty member in the College of Education, Health and Society. Mel has been using Agile in her courses for three years.

Participant C, known by the pseudonym "Mac," has a Ph.D. and was a faculty member in the College of Engineering and Computing. Mac has been using Agile in his courses for five years.

Instrumentation

The process of inquiry for the narrative approach was individual interviews. According to Lichtman (2013), individual interviewing is a method where the researcher engages in dialogue or conversation with a participant. In individual interviewing, the researcher directs the conversation since it has a purpose. Individual interviews have the flexibility to be highly structured or use little structure (Lichtman, 2013). There are several types of individual interviewing a researcher can use: structured, semi-structured, in-depth, and casual (Lichtman, 2013).

For the purpose of this research, in-depth, unstructured interviews were used (Lichtman, 2013). In in-depth interviewing, the researcher should ask questions in a general and non-direct manner (Lichtman, 2013). The researcher scheduled 60-mintue interview sessions with each participant. The researcher guided the narrative process by using the following interview questions:

1) How do instructors begin using Agile in their postsecondary classrooms?

2) What Agile practices are instructors using in classroom instruction for collaborative learning?

3) How does Agile influence collaborative learning in the classroom?

4) How do instructors perceive Agile to develop students' soft skills such as critical thinking, problem solving, attention to detail, communication skills, leadership abilities, interpersonal, and teamwork?

Data Collection Procedures

The primary source of data collection for this study was interviews. The researcher conducted a 60-mintue interview with each participant. The interviews were conducted during the month of January 2018. These interviews were conducted in a place requested by the participants. Two of the interviews were conducted in the participant's university office, and one was conducted at a local café. The researcher recorded all interviews with an audio device to ensure quality and accuracy, and the researcher also took notes by hand on paper. The audio recordings were kept confidential and were only accessed by the researcher and transcription service. The transcribed files that were returned by the transcription service were on the researcher's personal computer, which is secured by a password, encrypted, and secured WIFI network. The transcription files along with all the researcher's files pertaining to the interviews are backed up on a personal, external hard drive that is stored in a locked safe.

Data Analysis

The narratives collected were analyzed using the restorying process. Creswell defines restorying as "the process of reorganizing the stories into some general type of framework. This framework may consist of gathering stories, analyzing them for key elements of the story (e.g., time, place, plot, and scene) and then rewriting the stories to place them within a chronological sequence" (Creswell, 2007, p. 56; Ollerenshaw & Creswell, 2002). The retelling of the story has a beginning, middle, and ending, and the researcher provides a link between the ideas (Creswell, 2007; Ollerenshaw & Creswell, 2002). It is necessary for the narrative researcher to use

restorying since often interviewees do not tell their stories in chronological order (Gay, Mills, & Airasian, 2009). Interview transcripts and notes do not create a narrative account since they are not in chronological order or necessarily coherent (Gay, Mills, & Airasian, 2009). According to Gay et al. (2009), the restorying process has three steps. The first step is to conduct the interview and transcribe the interview recording to provide a written account of the interview. The researcher used a transcription service to transcribe all interviews. During this transcribing process, the researcher made annotations regarding the nuances of the interview (laughter, pauses, etc.). The second step in the restorying process is for the researcher to retranscribe the data by condensing and annotating the original transcript by identifying key themes and events in the participant's story.

The themes of the narratives collected were analyzed using Max van Manen's (1990) thematic analysis approach. In van Manen's approach, four analytical activities must take place. First, the researcher conducted a thematic analysis to determine the themes associated with the experience, separating incidental themes and essential themes (Gill, 2014). Incidental themes can change without influencing the phenomenon, and essential themes, make the phenomenon what it is (Gill, 2014). Second, the researcher described the phenomena through the art of writing, which requires multiple revisions (Gill, 2014). Third, the researcher must maintain a strong orientation to the phenomenon so he or she can practice "thoughtfulness," which allows a researcher to reflect on how he or she acts toward and understand the participants (Gill, 2014). Fourth, the researcher balanced the research context by considering the parts and the whole and stepping back from specific details to write textual expression (Gill, 2014).

The third step in the restorying process is to arrange the narrative into a story by chronological events and identifying key plot elements such as setting, characters, actions,

problems, and resolutions. After the restorying process is complete, the researcher collaborated with the participants on the final draft of the narrative. This helped the researcher to receive validation on her account of the narrative by the participant. The researcher emailed each research participant's narrative to him/her and asked the participant to review the narrative for proper interpretation. Any feedback from the participant to the researcher was received back via email and incorporated into the analysis.

Limitations of Narrative Research

There are several limitations associated with narrative research. First, the researcher must collect sufficient and extensive information (Lichtman, 2013; Creswell, 2007). It can be difficult to determine how much information should be collected, what information is relevant, and what information is important (Lichtman, 2013). Second, the researcher must clearly understand the lives of the participants during the data collection process so the stories that capture the participant's individual experience can be recorded (Creswell, 2007). Third, narrative research raises questions about who owns the story, who can tell it, who can change it, whose version is convincing, and what happens when stories conflict with each other? (Lichtman, 2013; Creswell, 2007). According to Lichtman (2013), if a story is told to a researcher and the researcher wants to use the story in her analysis, then she should get the participant's approval (Lichtman, 2013). Narrative researchers retell the story by reinterpreting it, which may influence the outcome of the story. If there are multiple stories on the same topic that conflict, the researcher may not be able to retell a coherent story (Lichtman, 2013).

In narrative inquiry, the researcher influences the narrative since he/she is part of the institution or environment where the research is conducted. Clandinin and Connelly state that the researcher is also part of the social narrative: "The stories we bring as researchers are also set

within the institutions within which we work, the social narratives of which we are a part, the landscape on which we live" (2000, p. 64). The researcher's own life and surroundings contribute to shaping the narrative. "In narrative inquiry, it is impossible (or if not impossible, then deliberately self-deceptive) as a researcher to stay silent or to present a kind of perfect, idealized, inquiring, moralizing self" (Clandinin & Connelly, 2000, p. 62).

Role of the Researcher

In qualitative research, it is important for the researcher to establish how she will interact comfortably with the participants to help ensure the success of the study (Gay et al., 2009). Since the researcher was a colleague of all the participants, she was comfortable interviewing them. The researcher and the participants have collaborated on training, publications, and conference presentations. She allowed each participant to answer all research questions in finality before starting conversation or responding. The researcher is an active and passionate agilist and Agile faculty member, which permitted her to understand all the Agile terminology that will be used in the interviews. The researcher asked for any needed clarification on terms and content stated, and did not assume she knew what the participant meant. Member checking was used to validate the interviews and constructed narratives after the final narratives had been constructed.

Summary

In summary, this study aimed to tell the stories of practicing postsecondary Agile faculty to uncover their perceptions about using Agile in postsecondary education, to explore if using Agile influences collaboration, and to collect perceptions if Agile influences transferable skills. William Carlos Williams said this to Robert Coles when he was a medical school student: "Their story, yours, mine - it's what we all carry with us on this trip we take, and we owe it to each other

to respect our stories and learn from them" (Coles, 1989, p. 30). This research told the stories of

Agile faculty so other educators can learn and inform their teaching and their students.

Chapter IV: Presentation of the Findings

"I expected my students to work in teams, but never gave them any framework for doing so. Agile gave my students a toolkit that transformed them from being a group of students to a team." –Mac

"Using an Agile mindset is starting to change the way my students are viewing their own learning...and they work and collaborate together, which is huge in my field." –Mel

"Using Agile gives me something to talk about to my colleagues, especially in other departments, who are interested in learning other ways to improve their courses and the management of their own work." –Kyle

Narrative research can help teachers understand their professional practice through storytelling (Caduri, 2013). The purpose of this study was to uncover faculty's perceptions about using Agile in postsecondary education, to explore if using Agile influences collaboration, and to collect perceptions if Agile influences transferable skills. The following research questions guided this study:

1) How do instructors begin using Agile in their postsecondary classrooms?

2) What Agile practices are instructors using in classroom instruction for collaborative learning?

3) How does Agile influence collaborative learning in the classroom?

4) How do instructors perceive Agile to develop students' soft skills such as critical thinking, problem solving, attention to detail, communication skills, leadership abilities, interpersonal, and teamwork?

Participant Demographics

The three participants interviewed for this research were from the same public Midwestern university in Ohio where they are faculty members. The participants identify themselves as Agile-practicing faculty who use Agile in their courses. All three participants completed Introductory and Advanced Agile Faculty Workshops and obtained their ICAgile Professional license. Even though they are from the same university, each participant represented a different college within the university.

Participant A, known by the pseudonym "Kyle," has a Ph.D., and is an assistant professor in the College of Liberal Arts & Applied Sciences. Kyle's interview was conducted at a local café at his request. Kyle is dedicated to his students, and is passionate about teaching them skills they can use when in the workforce. Kyle's passion for teaching can be heard in his voice and seen on his face when he talks about teaching. Kyle has been using Agile in his courses for one year. Kyle began using Agile in his courses as a project management methodology for his project management course. He started teaching Agile to his students as a project management approach for computer information and technology majors. As Kyle taught Agile in his course, he started to see how Agile could be used to manage group work and project teams. Once Kyle started using Agile for his group work and team projects and saw positive results, he began using Agile to manage his own teaching load and responsibilities. He uses Agile planning techniques, such as an online Kanban board called Trello to manage all his tasks for each course and his research.

Participant B, known by the pseudonym "Mac," has a Ph.D., and is a professor in the College of Engineering and Computing. Mac is a soft-spoken, experienced faculty member who carefully selects his words. Mac has been using Agile in his courses for five years. The

interview was conducted in Mac's office. Mac began using Agile in his courses after hiring a visiting instructor to teach a course for his department. This instructor introduced Mac to a book on Scrum, and this book made him realized how Scrum could help his teams work better together. Mac had been teaching his computer science courses based on waterfall methodology up until this point in time. Mac saw "Scrum as a toolkit to help a group of students become a team." For many years Mac taught courses where he had students work in groups, but he never felt that he equipped them with a way to work as a team—until he was introduced to Agile. Around this same time, an alumnus of the university where Mac taught was a C-level executive and was known as an "Agile evangelist." In his role as an executive, this alumnus was creating an Agile culture as his organization, and wanted more graduates to have Agile experience. Mac and this alumnus partnered to help bring Agile into higher education and into the community. This was the trigger that encouraged Mac to bring Agile practices into his computer science classes so his students could be exposed to the Agile way of thinking. Mac attended third-party Agile training so he could be educated on Agile, and then he brought this into his classes, and even developed an Agile-specific course for his department. This course taught students the Agile way of working and then partnered with a customer to develop a software product for a customer. The project was managed in an Agile manner so students could experience working in an Agile team. Mac also started meeting other faculty outside of his university who were using Agile, and they began collaborating on papers and presenting at conferences about their Agile experiences in the classroom.

Participant C, known by the pseudonym "Mel," has a Ph.D., and is a faculty member in the College of Education, Health, and Society. Mel is an outgoing, natural leader, who is extremely passionate about teaching. The interview was conducted in Mel's office. Mel has

been using Agile in her courses for three years. Mel was first introduced to Agile when she attended the Agile Faculty Learning Community meeting. Before Mel attended this meeting, she had "no idea of what Agile was," but she thought it paralleled project-based learning, something she used in her courses. After learning about Agile, Mel incorporated it at a 100% level into her courses. This was a struggle for her and her students, but this experience allowed her to see what Agile rituals added value to her courses and her students. The following semesters, Mel implemented only certain Agile rituals to help her cohort-based teams, but focused on incorporating the Agile mindset and the Agile culture into her courses. She has seen the most success with this approach. Mel integrates the Agile Manifesto for Teaching and Learning that was published by the Miami University Agile Faculty Community (Krehbiel, et al., 2017) in her course syllabi and course objectives to encourage an Agile mindset in her classes. Mel said that by implementing the Agile mindset in her courses, "it is starting to change the way my students are viewing their own learning…and they work and collaborate together, which is huge in my field."

Item Analysis

The narrative framework used in this study requires that after the stories are collected, they are analyzed for key elements, drafted, and then are rewritten in chronological order. This is called the restorying process. After the interviews were conducted, they were transcribed by a third-party transcription service. The researcher then retranscribed each transcript by condensing and annotating the original transcript by identifying key themes and events in each participant's story. The transcripts were then analyzed using van Manen's thematic approach (Gill, 2014). Table 1 illustrates the iterative analysis performed. Since iterative work is part of the Agile process, each transcript was reviewed, coding key words that appeared to be incidental themes in

four different iterations. In the first iteration, 24 codes emerged based on key words from the

research questions, collaborative learning pedagogy, and the Agile framework. In the second

iteration, codes were eliminated that had minimal data and combined similar codes. This

iteration narrowed down the 24 original codes to nine. For the third iteration, the transcripts

were reviewed again, calculating the amount of times each of the nine codes appeared to decide

between incidental themes that occurred and essential themes. The last iteration separated the

incidental themes from the essential themes. According to Gill (2014), incidental themes can

change without influencing the phenomenon, and essential themes make the phenomenon what it

is. The final iteration resulted in five essential themes: communication, instructor reflection for

improved teaching, leadership, accountability, and teamwork.

Table 1

Interview Iteration Process

Iteration	Codes
1 (original)	24
2 (codes were eliminated that had minimal data and combined similar codes)	9
3 (the transcripts were reviewed again, calculating the amount of times each of the nine codes appeared to decide between incidental themes that occurred and essential themes)	9
4 (separated the incidental themes from the essential themes using Van Manen's analysis)	5 essential themes

After the incidental and essential themes were finalized, the narratives were drafted.

Once the first round of drafting was completed, the researcher practiced "thoughtfulness," which

allows the researcher to reflect on how he or she acts toward and understand the participants

(Gill, 2014). The researcher then reflected on the whole narrative and specific details to write

textual expressions.

The last step in the restorying process is for the researcher to arrange the narrative into a story by chronological events and identifying key plot elements such as setting, characters, actions, problems, and resolutions. After the restorying process is complete, the researcher collaborated with the participants on the final draft of the narrative. The restorying process supported validation on the narrative accounts by each participant.

Themes

The thematic analysis revealed five themes: communication, instructor reflection for improved teaching, leadership, accountability, and teamwork. These five themes appeared in all participants' interviews more than six times each, and all participants spent the most time talking about these five themes. Table 2 illustrates the 24 codes that originally emerged in the analysis. Table 2 highlights the code, which developed into the essential five themes, the research question where the code appeared, and the number of participants where the code appeared. The themes underlined were the five essential themes that were discussed in this analysis: communication, instructor reflection for improved teaching, leadership, accountability, and teamwork. The themes of leadership, accountability, and teamwork were combined together because as the researcher coded the transcripts and wrote the participants' narratives, these three themes consistently appeared in the text together, often in the same sentence. As the participants discussed one of these three themes, they brought the other two themes into their stories.

Table 2

Major Themes Collected from the Data

Theme	Research Question Where Theme Appeared	Number of Participants Where Theme Appeared
Communication	1, 4, 3	3
Cohesion	1	1
Kanban	2	1
Reflect/Retrospectives for better teaching	2, 4	3
Sprints	2, 3, 4	3
Progress	2	3
Retrospective	2, 3, 4	3
Ongoing feedback	2	3
Constructive feedback	2	2
Planning	2	2
Story cards, user stories	2	3
Flexible	2	1
Manage activities	2	2
Engage	3	2
Visibility	3	1
Awareness	3, 4	1
Leadership	4	3
Accountability	2, 4	3
Teamwork	2, 4	3
Problem-solving skills	4	2
Self-organize	2, 4	2
Iteration/Iterative	1, 2, 3	2

Theme 1: Communication. The theme of communication appeared in two different contexts—communication among team members, and communication between the instructor and student teams. All three participants discussed how the Agile mindset and Agile rituals help their student teams to communicate better. Mac summed it up when he said, "Agile gave my students a toolkit that transformed them from being a group of students to a team." Mac spent much time talking about how iterative work cycles, planning, user stories, daily stand-ups, showcases, and retrospectives help his student project teams to discuss the project, but also to assign out the work, and meet deadlines. Agile makes students talk, discuss, and reflect on their work. Mac mentioned how Agile practices foster communication among team members, because they must go through the Agile process, which requires talking. He has witnessed Agile fostering communication, trust, courage, and accountability among his teams. When teams communicate, they learn more deeply about each other and the work they are doing together. Students have given Mac feedback that they like how using Agile rituals helps to build trust among team members.

Mac also spent time talking about how the "cadence of Agile" helps to build communication, collaboration, self-improvement, and leadership. He said that since Agile "creates a standard work cycle," students begin to produce the same results over and over. He said the cadence of Agile helps students to develop transferable skills because students who practice Agile rituals week after week, "improve the quality of their work, efficiency, communication, and become self-organized."

Kyle noted improved communication among his student teams when using Agile. Kyle used the Agile ritual of daily stand-ups to help teams to "stop, think, and reflect" on their work. When Agile daily stand-ups are part of a team project, team members discuss and reflect on what

they have done so far and what do they need to be doing. Kyle had each team share with the class their progress so far to help create awareness of where each team is and how they are getting there. When Kyle used Agile for group work and team projects in his courses, he observed an improvement of cohesion in the groups, improved communication among group members, and awareness of the project timeline and each group member's role. He uses Kanban boards, user stories, daily stand-ups, sprints, and retrospectives in his collaborative learning activities with his teams. Kyle used Kanban boards to help his students track the work that needs completed for the project. He used the online application Trello as a user story board. This helped the entire team to have a clear view of the project and their team's progress, and helped them communicate about what work needs done.

Kyle stated how Agile helps improve his communication with his student teams. Kanban boards helped him to have visibility into each of his project teams. He observed which teams are on track by reviewing their user stories on the Kanban boards, and see which teams behind or struggling. This allowed him to intervene and help guide the teams back on track so there is no mad rush near the project deadline to complete the work, or have a team fail because they were unable to complete the project tasks on time. Without the Kanban boards to visually see the work student teams have and the progress they have made, Kyle said he may not know a team is in trouble until it is too late. Agile helps him to communicate and have dialogue with his teams.

Mel said during the interview that using Agile "is helping with their communication." She said that since her teams started using Agile rituals, she has had fewer students come to her "with problems with their group members. I feel like they are the way that we do things and the tools that they're given, they find it easier to talk to each other because it's all, you know,

transparent." As Mel passionately described the change she has seen in her student teams over the years, she said it is because "they talk to each other."

     Theme 2: Instructor reflection for improved teaching. Agile is known for helping teams to work efficiently, communicate, and produce a higher quality product. This research revealed the dominant theme of how using Agile retrospectives at regular intervals help the participants to be better instructors and to adapt their course and instruction and leadership. Agile retrospectives are an Agile ritual where a group or team reflects on their last iterative work cycle to see what went well, what could be improved, and what lessons they learned. In the typical retrospective, each team member answers three questions: What went well during the last work cycle, what did not go well, and what should we start doing in the next work cycle. In industry-based Agile teams, retrospectives occur every two weeks. The purpose of a retrospective is to inspect and reflect on the previous iterative work cycle so teams can make changes to improve efficiency and optimization for the next two-week work cycle. Retrospectives help teams communicate and refine their work processes.

     All three participants commented that they receive more valuable feedback about their courses in Agile retrospectives than in their course evaluations. Kyle called Agile retrospectives "a low barrier" for students to provide value-added feedback. For example, if students have feedback, they have to remember to send an email, visit office hours, or stay after class to talk to the instructor. A retrospective in class allows students to provide immediate and focused feedback because they are sitting in class. Kyle told a story about one of his computer-based classes. During a retrospective, which was a few weeks into the course, he found out that half of the keyboards in his classroom did not work. He did not understand why no one had told him

about these keyboards until the retrospective. Kyle went on to explain how students share more information and provide constructive feedback during retrospectives if they are done in class.

While Kyle does not use retrospectives as part of his group work, he uses retrospectives for the entire class. For example, every three weeks or at the end of a major module, he will hold an all-class retrospective. While Kyle did not specifically state the retrospective question he asked his classes, the three standard Agile retrospective questions for education are: "What went well (for this module)?," "What could be improved?," and "What questions do you have?" In typical retrospectives students write their responses to each of these three questions on post-it notes and place them on a wall or white board in the classroom. Students were only permitted to write one comment or thought per post-it note. Kyle then grouped the post-it notes by theme, and then there was a discussion about them. Kyle said doing this Agile retrospective helps him as an instructor to see what is going well, what needs changed or improved, and what questions his students have. He takes the feedback from the students and posts it in the online learning management system for record keeping purposes. This allowed him to have open communication and visibility to the students about their feedback in the retrospective. As Kyle worked through the retrospective feedback, he posts his responses in the learning management system so his students can see that he is working through the feedback and keeping them informed of the decisions he is making about the course. He posted the retrospective feedback online so his students can comment and engage in conversation about the feedback. Kyle said that he and his students benefit from retrospectives. He gets to improve his teaching and students get to see that he values their feedback and is taking action on it. Kyle is invested in his students and dedicated to improving his teaching and the outcomes for his students. He is not a faculty member that teaches the same course the same way semester after semester. Agile retrospectives are a tool

that assists him in receiving valuable feedback he can use to improve his teaching and his courses. Kyle said that he uses Agile methods to manage my his own workload, which prompts him to be more fluid and flexible.

Mel told a similar story about how she "usually does not get a whole lot out of course evaluations." She said, "I think it's hard when I get the feedback at the end and I'm preparing for a different set of students, at the course evaluations, so with the retros I can just adjust my teaching and talk about what's going well." Mel brought up a point with end-of-the-course evaluations about how an instructor supposed to change her current students' experience and learning outcomes after the course is completed (when the evaluations are conducted). She can only change the course for the next set of students who take her course. Mel used retrospectives after the end of every module in her courses. This allowed her to know if she needs to adjust her teaching to directly influence the learning outcomes for her students. Like Kyle, Mel told a story about the type of information she received from Agile retrospectives and why she has integrated them into her courses. Mel implemented a new assignment in her literacy course where students bring a book of their choice to class for a few minutes of silent reading to support the course objectives. She made sure to state that there was a pedagogical reason for the implementation of this assignment. Mel said that she was not sure if this was working or if she even liked this part of class because she felt the time could be better used. After a few weeks, Mel conducted her usual Agile retrospective, and there was unanimous support for the silent reading for both sections of this course. Mel said she was shocked, and she was planning on taking this out of the course. She said, "if I wouldn't have asked them, I probably would have taken that out. And sometimes you think you know what is going on and you don't." This feedback may not have appeared in the course evaluation unless a specific question was asked regarding the silent

reading time. Mel said that conducting retrospectives every three weeks in her courses allows her to have insights to her students, her teaching, and her courses. She can make immediate changes that impact her current students.

Mac, who is a concise and reserved speaker, was passionate about this topic. He said that Agile allows him to minimize lecturing, which he feels is the least effective teaching method. Agile helps him to promote the concept of the "inverted classroom," due to the communicative nature of Agile. The inverted classroom shifts from a lecture-based approach to a learner-centered model. Agile tools encourage collaboration and communication between students and between the instructor and the students. As Mac observed his student teams going through the Agile process of planning, daily stand-ups, showcases, retrospectives, and iterations, he can intervene with teams that need assistance or can provide clarifying information to the entire class on a topic if he sees the same gap across the teams. Mac ended our conversation about this topic with: "Agile gives us a continuous improvement tool with students. Agile retrospectives are a continuous improvement tool for faculty as they teach."

Theme 3: Leadership, accountability, and teamwork. The relationship of these three words became evident as the themes were coded. When the research participants talked about how Agile helps students develop soft skills, the words "leadership, accountability, and team work" emerged for all three participants. It seemed natural for these three terms to be used together when discussing the benefits Agile brought to their students. Kyle stated that "Agile helps students develop transferable soft skills, even if students do not realize it. Daily stand-ups help students to critically think and not rush ahead in their work while gaining awareness of the project at hand."

All participants spent time discussing how Agile influences leadership. All participants discussed how Agile helps their student teams to have equally distributed leadership. The participants all noted that when their teams use Agile, there is not one individual who dominates the team and completes the majority of the work just to get the project finished on time. Agile creates more self-organized teams where the workload is more evenly distributed and allows all team members to have accountability and a leadership role. Mel discussed how she sees Agile having a major influence on educational leadership positions. She stated that Agile can help administrators manage their buildings, departments, and projects. Mel said that she has had a few students give her feedback that Agile gave them tools to work as a team and they felt confident in dividing up the work, and not taking all the work on themselves to earn a good grade. This is one of the reasons why students hate group work because sometimes one or two people on the team do all the work to earn a good grade while everyone else slacks. Mac commented how he has received feedback from students saying that "Agile helped them to build trust among their team members," so they can equally share the work. Kyle also made an insightful statement about Agile and leadership skill development in students.

> In regard to leadership, he said that he does not think Agile helps students develop leadership skills with a capital "L," but with a lower case "l." Agile helps students to take ownership of their work, become transparent in sharing information, and helps them gain accountability. Agile helps students gain and refine their communication and teamwork skills. They are able to see a group project as more of a group effort than just a combination of a bunch of individuals getting work done.

In the classes where Kyle uses Agile, the content of the course and the projects connect better for students compared to when Agile is not used. Kyle commented that he observed Agile

helping students with their problem-solving skills because they learn to think through the project earlier by applying their problem-solving skills, which helps to prevent a disaster in the project later. Agile projects also help students self-organize as a team, and have a group leadership model. In his Agile project teams, Kyle does not see one person who dominates and takes over a team, or people who do not contribute to the team or project. He said, "Agile promotes communication among group members, which prevents one person from dominating the team."

As Kyle discussed the skills he sees his students developing during Agile projects, he began talking about the Agile rituals he used in his courses. This was a natural transition from the discussion about transferable skills, which highlighted the connection Kyle made between transferable skills and Agile rituals. Mac made a similar statement about how Agile gives students a toolkit to be team, so there is a natural connection between Agile tools and team/individual skills. Kyle uses Kanban boards, user stories, daily stand-ups, sprints, and retrospectives in his collaborative learning activities. He used Kanban boards to help his students track the work that needs completed for the project. This helped the entire team to have a clear view of the project and their team's progress. This helped to develop accountability between team members because everyone on the team can see what work exists on the user story cards, and each team member is assigned work. Kyle said that it is difficult for team members not to do the work they are assigned when the entire team (and the instructor) can easily see on the Kanban board what each team members has been assigned. Kyle also stated that Kanban boards help him to have visibility into each of his project teams. He can see which teams are on track by reviewing their user stories on the Kanban boards, and see which team or team member is behind or struggling. This allowed him to intervene and help guide the teams or team member back on track so there was no mad rush near the project deadline to complete the work, or have a

team fail because they were unable to complete the project tasks on time. Kyle had teams write user stories for the work required for each project, which helps a team to break down the work into sizeable pieces. User stories helped teams to track their work by what is actively being worked on and what is finished.

Over the years of teaching, Kyle has discovered that most students do not know how to work in a project team. He incorporates Agile sprints into his project teams to help bring structure to the project. Sprints are a designated time period that a team has to complete a certain amount of work. Kyle stated that sprints help his students to work at a steady pace instead of cramming all the work in at the last minute. He observes that sprints also help his students to think critically about their project work so they do not just rush in and start working to get the work done to find out at the end they missed an important piece.

Mel said the two transferable skills that stand out when she observes her students working in an Agile manner are: "leadership and communication." Mel teaches future teachers and she had a different perspective on how Agile develops leadership and communication skills. She said that she used what she calls the "Agile horserace" concept to help students learn how to come to a consensus on a topic. Mel said this consensus building activity helps future teachers to communicate democratically with each other, and gives them a tool they can take into their classrooms to teach their students or to use with fellow teachers or administrators when an idea needs generating. She uses this during her own department meetings as well. Mel said the Agile horserace "is well received and used often." Again, this is another example of how an Agile ritual encourages teams, students, faculty, and administrators to work together.

Mel told a story about how she sees Agile influencing the leadership skills of students. Each summer she participates in a program where she teaches high school junior and seniors in a

leadership course. She said her most successful time teaching the summer program was last year (2017), when she used Agile as the framework for the course. She managed the entire course using the Agile framework and taught the students how to work as an Agile team. As part of this course, the students planned an event using the Agile framework and rituals. She called it an "Agile simulation." Mel said that the students "loved it," and that "they wish that they knew some of these strategies in high school to plan prom or we could have used Agile to plan this event for that committee. They were starting to see the connections." Mel plans on using Agile again in the summer course for 2018. She also mentioned that some of her students (past and present) come to tell her that they used an Agile ritual they learned in her class at one of their sorority or organization meetings. Mel said that she can see how the students transfer the Agile skills she teaches to other aspects of their lives. She ended our conversation on this topic with, "Many of them are in leadership roles and they feel more comfortable leading since they have these Agile tools."

Mel's students work in cohorts according to their majors, so they take all the same classes together and spend a lot of time together working on projects. She said accountability is not a huge problem for her students because they know each other well, and address any accountability concerns in conversations.

More than once during our interview Mac mentioned that "Agile encourages teamwork, and teamwork improves collaboration, communication, and accountability." Mac said that giving students multiple, short deadlines, which is an iteration, was the key to the improved quality. By introducing iterations into his courses, he observed students being more accountable and having increased communication. As his students worked in iterative cycles, he saw teamwork being fostered and teams behaving like a team instead of a group of students assigned

to work together. After introducing iterative work cycles to his students, he also saw an Agile culture beginning among students. He saw a "culture of trust, courage, and accountability" developing upon his student groups. After Mac observed changes to his student groups using iterations, he started incorporated more Agile practices such as user stories, planning, daily stand-ups, showcases, and retrospectives. Mac explained that having teams create user stories helps to be self-managed, where no one leader emerges or dominates the team. He said that user stories break the problem or project down into smaller units, and then during Agile planning, the team can decide the priority of the work. Again, not one dominant leader emerged, but a team of people who can lead their own work. Mac explained that daily stand-ups helped teams to communicate and learn to talk to each other about their work. Agile showcases increased individual and team accountability because during an Agile showcase a team or individuals demonstrate the work they have completed during an iteration. Mac said that students do not like to get up in front of their class or client and not have anything to demonstrate, so Agile showcases create accountability.

Summary

In the spirit of Agile retrospectives and continuous improvement, the researcher thoroughly enjoyed the interviews and the restorying process. The restorying process was a continuous improvement checkpoint in this narrative research journey, so the researcher could retell the participants' without influence of her own thoughts, perceptions, and views. This research indicates that Agile brings benefits to students in the postsecondary classroom, but it also revealed that Agile is a tool instructors can use to improve their teaching. Agile teams regularly conduct retrospectives to help them work better together so they can improve the efficiency and quality of their work. Based on these interviews, Agile retrospectives come are a

simple technique for continuous improvement feedback in the classroom, and particularly more effective than waiting for course evaluations after the term is completed. Agile retrospectives allow instructors to gain timely feedback about their courses, students, and provide an opportunity to make changes that can positively influence the rest of the course. Kyle said that regularly hears from juniors and seniors who say they wish they would have known about Agile earlier in their academic careers because it would have really been helpful in other projects.

Chapter V: Summary, Conclusion and Recommendations

This dissertation sought to identify perceptions of the application of Agile in postsecondary classes to affect both the product and process of learning by Agile-practicing faculty. The investigative nature of this research aimed to expand the scholarship of teaching and learning by exploring if Agile can yield positive outcomes to postsecondary education. The final chapter of this dissertation discusses how this research answered the research questions and the implications of the findings. The research questions that guided this study were:

1) How do instructors begin using Agile in their postsecondary classrooms?

2) What Agile practices are instructors using in classroom instruction for collaborative learning?

3) How does Agile influence collaborative learning in the classroom?

4) How do instructors perceive Agile to develop students' soft skills such as critical thinking, problem solving, attention to detail, communication skills, leadership abilities, interpersonal, and teamwork?

Summary

Each participant saw Agile as an opportunity to enhance a subject or concept they were already teaching. Kyle saw Agile as an option to teach project management in his project management course for computer information and technology majors. Mac was introduced to Agile by an adjunct professor and immediately saw Agile as a method to give his students tools to work better in teams. Mel used Agile to enhance her project-based learning approach to teaching. The variety of reasons instructors started using Agile is reflective of the very nature of Agile. Agile developed out of the computer software development industry sector and is now being used across many industry sectors, even non-technical ones, such as education.

Even though all three participants interviewed in this study started using Agile to enhance their students' classroom experiences, they all also mentioned other benefits that they were not anticipating. Kyle and Mel discussed how Agile retrospectives helped them to be better instructors by providing real-time (as opposed to end-of-the semester) feedback into their courses every few weeks. This allowed Kyle and Mel to shift their teaching to better meet the needs of their students. Mel noted how Agile helps give her students, who are future teachers, tools to use in their classrooms and with their colleagues to increase collaboration and communication. Mac discovered that Agile not only gave his student teams tools for working as a team, but also helped his teams to build a community of trust among themselves.

The theme of communication, which emerged as a result of this research, was evident in the participants' journeys to using Agile in their courses. While the participants started out using Agile to address a specific need in their courses, Agile fostered communication channels between the instructor and students and between students that were not anticipated. This communication positively influenced the instructor's teaching and students' learning in the areas of trust, accountability, and methods to encourage team member communication.

In regard to the question "What Agile practices are instructors using in classroom instruction for collaborative learning?," Agile practices instructors used in their classroom for collaborative learning was similar for all participants. Kyle and Mac used the most Agile practices such as user stories, story walls (physical and virtual), planning sessions, iterations, prioritization, estimating, daily stand-ups, showcases, and retrospectives. Mel used the Agile mindset, retrospectives, and consensus building tools (such as the horserace). Mel also used the entire Agile framework to teach a summer program to high school students where they had to plan an event. Mel said Agile gave her summer high school students tools to use to plan an

event, and they wished they would have known about this before they planned major events at their schools, such a prom. Mac said that Agile gave his students the tools needed to transform from being a group to a team. The Agile framework and the Agile practices included in the framework give students tangible tools students they can use during collaborative work. Mel also noted how Agile can help administrators and faculty members conduct work and complete projects because Agile is a framework with tools to use at each interval to make steady progress.

In regard to the question "How does Agile influence collaborative learning in the classroom?," the answer resides in the collaborative learning approaches outlined in Chapter 2 and in the participant interviews. This research found that Agile gives students' tangible tools to be more than a group—to be a team. Mac said it best: "Agile gave my students a toolkit that transformed them from being a group of students to a team." According to Johnson et al. (1998), collaborative learning emphasizes that learning occurs naturally as an effect of students working together in unstructured groups to create their own learning. This aligns with Vygotsky's social constructivist theory, which states humans learn from each other from social interactions (Vygotsky, 1986). Vygotsky's research suggested that students' learning in the classroom is derived through social interactions with their peers and instructors. Vygotsky (1978) believed that students cannot understand a new concept or idea unless they receive feedback from their instructor or peers. In order to have social interactions with their peers, students must work in a collaborative manner, which can be cooperative learning, problem-centered instruction, writing groups, peer teaching, discussion groups, or learning communities. These core collaborative learning approaches create the environment for students to interact with each other, to learn by hearing what their peers say, and develop their own knowledge based on their interactions and feedback. Vygotsky also believed that language influenced a higher order of thinking, reasoning,

writing, and reading among learners (Vygotsky, 1978). All the collaborative learning approaches summarized in Chapter 2 help foster a classroom where students are engaged in communication and language, so thinking, reasoning, writing, and reading are working together to influence student's learning. There was one missing element in all the traditional collaborative learning approaches: a standard set of tools for student teams to use to foster group collaboration. This was what Agile brings to collaborative learning. Agile brings a consistent set of tools that students and instructors can use in all disciplines to enhance communication and increase the effectiveness of collaborative learning activities.

Agile makes students talk, discuss, and reflect on their work. Mac mentioned how Agile practices foster communication among team members, because they have to go through the Agile process, which requires talking. has witnessed Agile fostering communication, trust, courage, and accountability among his teams. When teams communicate, they learn more deeply about each other and the work they are doing together. Mel said that since her teams started using Agile rituals, she has had fewer students come to her "with problems with their group members. I feel like they are the way that we do things and the tools that they're given, they find it easier to talk to each other because it's all, you know, transparent." Mel said the changes she has seen in her student teams over the years is because "they talk to each other." Instructors are looking for tangible skills and practices they can teach students to use in teams. Students are looking for tangible skills and practices they can use to work in teams. Agile is that toolkit for instructors and students.

The final research question, "How do instructors perceive Agile to develop students' soft skills such as critical thinking, problem solving, attention to detail, communication skills, leadership abilities, interpersonal, and teamwork?," yielded that instructors perceive Agile does

help students develop transferable skills they can take with them to other courses and to the workforce. The transferable skills the participants in this study noticed as a result of using Agile in their courses were communication, leadership, accountability, and teamwork. Based on a 2016 study by PayScale, employers also reported that 56% of new graduates do not pay attention to detail, 46% need to polish their communication skills, 44% lack leadership qualities, and 36% reported graduates lack interpersonal and teamwork skills (Strauss, 2016). Agile can help students develop and practice their transferable skills so they are workforce and ready.

A review of the collaborative learning approaches discussed in Chapter 2 identifies a missing element in these approaches. This missing element is a standard set of tools for student teams to use to foster group collaboration. Agile brings tangible tools student can use in collaborative learning settings. Agile tools enhance communication and increase the effectiveness of collaborative learning for students. Agile tools also provide instructors with a tool to reflect on their teaching as they teach. Agile retrospectives provide a tool for instructors to gain feedback on their teaching and made immediate changes for their students.

Restorying Results

All participants had three weeks to review their narratives and provide feedback. All three participants responded back and did not have any changes to their narratives.

Conclusions

The inclusion of the Agile framework and practices in postsecondary curriculum yields advantages for both students and instructors. First, Agile provides a set of tangible tools through its set of practices that instructors can use to enhance collaborative learning in the classroom. Instructors can teach students Agile practices to help their teams work more efficiently. Since these Agile practices are used in a cadence cycle, students become familiar with them, know

what to expect, and how the Agile practices are used. Students can then take these Agile practices and use them in their team projects and assignments. Since Agile is being used in different industry sectors, students will also leave postsecondary institutions with transferable skills and the knowledge of an Agile culture.

Second, Agile provides instructors with a reflection tool to help improve their own teaching. Agile is known for helping teams to work efficiently, communicate, and produce a higher quality product. This research revealed that Agile retrospectives help instructors to be better teachers. Two of the three participants commented that they received more valuable feedback about their courses in Agile retrospectives than in course evaluations. Agile retrospectives helped instructors gain insight on their course and students in the present, so they can make any adjustments before the course ends. This adds value to the students' learning outcomes, since the instructor can make immediate adjustments to influence their learning outcomes for the current course—not the following course after the instructor reviews the final course evaluations.

Since Agile started in the software development industry sector, the majority of current scholarship discusses using Agile in software-based postsecondary courses for software development and software project management. The results of this research add to the minimally existing Agile knowledge base of how Agile can be used in non-software postsecondary courses to increase the learning outcomes for students, and help instructors improve and reflect on their facilitation. This research helps start the conversation of using Agile in all disciplines across the curriculum.

Recommendations

The positive feedback about Agile in the postsecondary classroom collected from the participant narratives is encouraging. Two-and-four-year institutions should consider introducing faculty to Agile concepts by holding Agile workshops and starting Agile Learning Communities.

Postsecondary institutions should consider integrating Agile into the curriculum during the first-year of academics so students have tools to help them work successfully in teams throughout their entire academic careers. As one participant noted in this research study that when she introduced high school students to Agile, they wished they knew about Agile before they had to plan a big event. Agile can help improve teamwork in postsecondary education.

Additional research needs conducted about how Agile influences postsecondary education. Since using Agile in postsecondary education is a newer concept, more scholarship of teaching and learning needs conducted to evaluate the contribution of Agile in postsecondary education.

The Agile process and in particular, Agile retrospectives, should be further researched as a method of continuous improvement for instructors. All three participants in this study used Agile as a tool to reflect on their teaching so it could be improved throughout the duration of the course. Agile retrospectives should be further researched as a possible informal evaluation technique instructors can use throughout the duration of a course to gain feedback from students and make any changes that could improve student learning outcomes.

This research exemplifies how narrative research can be beneficial in the field of education by telling the stories of Agile-practicing faculty and the results they have experienced. Gay et al. (2009) state that sometimes educational issues cannot be understood with statistical

data; narrative research allows for the voice of the practitioner to be heard and validated. This research allows for first-hand accounts of how Agile influenced postsecondary classrooms across different disciplines. Since Agile is a collaborative process, the research method for this research should be collaborative. Narrative research collaborative process since the researcher and the research participant collaboratively tell a story about an experience (Gay et al., 2009). Educators can use narrative research to validate practices in teaching and learning.

Future Research

Three findings emerged in this research process that warrant future research. The first two ideas came from my doctoral research committee. My multi-disciplined research committee was an invaluable asset to my research and my thinking. One committee members suggested that I continue with the research in this dissertation, but widen the participant pool by trying and conduct national research and collecting quantitative data. I plan on seeing how I can locate and connect with other Agile faculty across the United States and conduct a quantitative survey. If you are interested in participating, please email me at hulshuar@miamioh.edu.

The second research idea is to compare the six different collaborative learning methods discussed in Chapter 2 to the themes discovered in the Agile narratives I collected. This comparison could be expanded to any additional data I may collect in future studies. The outcome of this research is to see if Agile can be established as an epistemology for collaborative learning.

The third research idea emerged from my participant interviews. My interview with Mel revealed how her students transfer the Agile tools they learn in her class their outside interests, such as sororities, fraternities, and student organizations on campus. Students are discovering how Agile rituals can help them organize events and be leaders. Mel's story about her high

school juniors and seniors said they wish they would have known about Agile to plan prom or other events. I am interested in how Agile can be introduced at the PK-12 level and early on in postsecondary experience to arm students with a framework and tools to work on teams, in and out of the classroom, and to emerge as leaders.

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