

Agile Methodology in Educational Leadership: Scrum

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Abstract. Education world experiences evolution and revolution adjacent to the development of environment and technology. The actors participating in education world are now facing a future challenge which is volatile, uncertainty, complexity, and ambiguity (VUCA) due to the rapid change in environment and disruption of technology. This paper is a literature review on Scrum, a framework for growing and strengthening complex product adapted from software development and particularly expressed in educational leadership. Scrum is one of agile methodologies worth of implementing with servant leadership. The theory of Scrum as an agile methodology such as transparency, inspection, and adaptation are described and the map of agile manifesto is defined in educational leadership context.

Keywords: Agile Methodology, Education, Leadership, Scrum

1 Introduction

An adjustment with the times should be carried out by the leaders because the world is changing quickly. The current educational system is, regrettably, out of date. We continue to administer education like we did throughout the industrial era, which used to make perfect sense but is now out of date [1, 2]. Due to the fact that we now need to train leaders and highly adaptable thinkers in addition to employees, this results in a mismatch between the educational offer and market demands. This transformation is supported by the following three principles:

1. Less emphasis should be placed on testing students' ability to retain knowledge and more should be placed on helping them acquire 21st-century abilities including teamwork, communication, critical thinking, creativity, and ICT proficiency.
2. The shifting needs of society. Knowing your strengths and shortcomings becomes even more crucial as your time at work comes to an end and more emphasis is placed on teamwork and collaboration.
3. Moving beyond merely imparting knowledge to assist students in growing as people and fostering the development of their unique talents. The source of knowledge is no longer the teacher.

Students' attitudes must also alter and we must work with students to help them shed their previous teaching methods' attitudes [3, 4]. Many students recline as if watching a movie in a theater. This movie mentality must be left behind by students. With Scrum, students collaborate in teams actively, effectively, and efficiently while also having more fun [5]. Giving the students control over their own learning processes and, most importantly, having faith in them will help achieve this [6, 7]. Due to the freedom and room provided, the students assume responsibility for their actions. Students as a result are more involved, more productive, and achieve higher achievements and they come to terms with their identities and skills.

One of the most popular frameworks for software development processes is agile. It is built on some fundamental ideas and principles, such as those found in the Agile Manifesto, and aims to make the traditional, linear waterfall approach more adaptable to the real world, where requirements and solutions are always changing [8, 9]. Agile strives to minimize resource, development, and labor waste by favoring an iterative and team-based approach [10, 11]. Several approaches, including eXtreme Programming and Scrum, have been developed within the Agile culture, extending and executing its values and principles [12, 13].

The fact that Agile lays more emphasis on human aspects, concentrating on the talents and skills of individuals, is one of its most pertinent consequences for leaders implementing Agile [14, 15]. If a project's team members are talented enough, they can complete their task using practically any method. Agile encourages people to collaborate effectively, using their unique skills in teams to effectively accomplish shared goals [16, 17].

These problems need to be briefly discussed especially in educational leadership. For this reason, this study aims to give illustration of Scrum in education, particularly in education leadership. The cutting-edge aspect of this paper is that there is less special study explains briefly the implementation of Scrum in education leadership.

2 Method

The four steps in writing this review include seeking for literature, interpreting the findings of a literature search, and creating a literature review. This study is based on the literature and the article is built on a system of earlier articles on leadership and agile approaches in education in order to provide a theoretical framework and present an agile methodology in education using Scrum. The main focus is on using resources from the Web of Science databases, Scopus, Google Scholar, and Researchgate. Based on the study by the authors Sojka and Lepk [18], the review process depicted in the following picture was created. This justification, in our opinion, is crucial for comprehending and modeling leadership style serving the educational sector, particularly in least-developed and emerging nations where leaders need to apply leadership theories to foster the growth of public organizations.

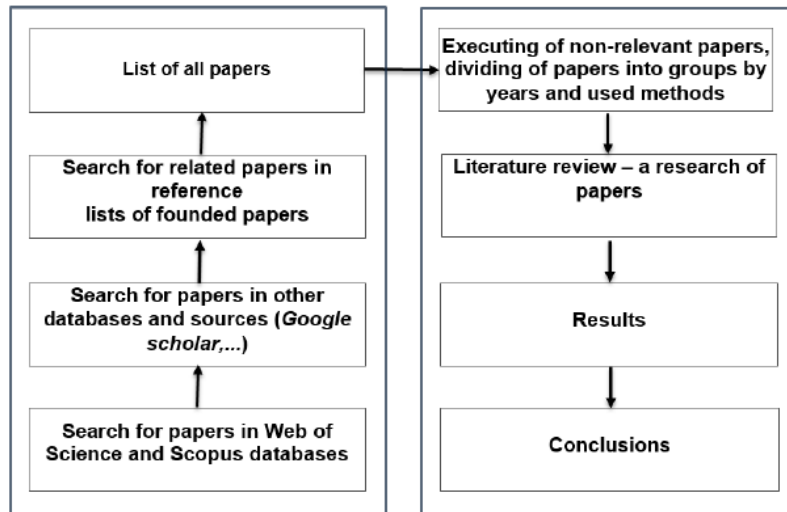


Fig. 1. Flowchart for conducting a literature review.

3 Results and Discussion

Jeff Sutherland, the creator of Scrum, asserts in the book "The Art of Doing Twice the Work in Half the Time" [19] that Scrum, a well-known agile process for software development, can be multi-faceted and helpful in many areas of life, not just the business world. Sutherland also describes how Scrum is applied in education, citing a Dutch chemistry class as the origin of eduScrum.

Mark Reijn, a software programmer at the Dutch company Schuberg Philis, introduced Scrum to the author while she was a science instructor at Ashram College in Alphen aan den Rijn. Excited by the Scrum concepts, he started applying a modified version of Scrum with his kids in 2011, getting amazing results. His students ranged in age from twelve to eighteen. His kids learned valuable life lessons including accepting responsibility for their work and how to be motivated, focused, and hardworking, and they grew eager to collaborate on team projects. The author established eduScrum and created the eduScrum handbook to help other instructors apply that unique version of Scrum that was tailored especially for educators in their schools.

Empiricism, or empirical process control theory, is the basis for both Scrum and eduScrum. According to empiricism, knowledge is derived from experience and decisions that are based on what is known. eduScrum is an incremental, iterative methodology to reduce risk and maximize the attainability of learning objectives. Every application of empirical process control is supported by the three pillars of transparency, inspection, and adaptability.

Scrum in Education

Numerous scholars investigated how to modify Scrum for use in educational settings. The "eduScrum" [20] guide, which translates the Scrum process, roles, and responsibilities in pedagogical terms and may be used to teach any subject at any educational level, is one pertinent approach.

The instructor takes on the job of the product owner, determining what needs to be taught and supervising, processing, and grading the students. His or her major objective is to deliver the greatest value in terms of hard skills like planning, organization, collaboration, and teamwork, as well as discipline-specific learning objectives.

The student team is independently organized with the goal of incrementally and iteratively obtaining (delivering) learning results. The team performs at its best with the aid of an eduScrum master, who is selected by the product owner or the class.

The sprints themselves are mapped within the context of schooling. The tasks are thought of as time-boxed events with a maximum runtime that are intended to permit vital transparency and inspection. Therefore, the sprints are groups of work that are purposefully organized to accomplish the learning objectives and typically last no more than two months. Ceremony participants in eduScrum can expect:

- the 5-minute stand-ups that take place at the start of each class to coordinate activities and organize the following meeting;
- a review of the previous sprint's activities to highlight what members learnt;
- a retrospective to develop a strategy for improvement and planning the following sprint.

The following are eduScrum's most crucial features:

- It specifies "Why" and "What," but it leaves out "How" (processes, techniques)
- Students are autonomous and accountable for their own learning. The teacher transfers responsibility to the students.
- Students learn how to interact more effectively, learn more effectively, and learn more about themselves while using eduScrum.
- Along with enhancing learning outcomes, eduScrum also teaches students how to collaborate in teams and identify their areas of strength.
- For teachers, an essential component of eduScrum is adopting an agile mentality that allows them to trust their students and give them the freedom to decide how they will meet the learning objectives.
- As a result of ownership and a continual improvement process, the caliber of students' accomplishments is continuously changing during the academic year.

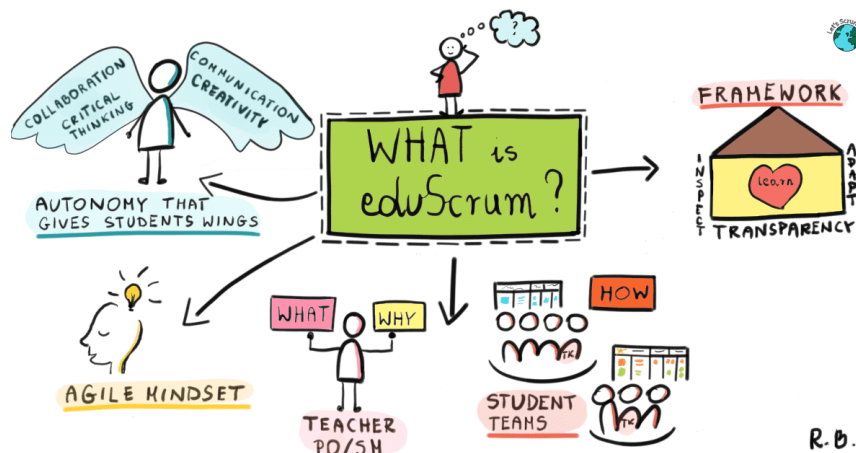


Fig. 1. Illustration of EduScrum

Regarding the use of Scrum to educate software engineering, the literature lists numerous instances in which it was successfully applied [21, 22, 23]. Both undergraduate and graduate courses use Scrum to manage the creation of academic projects. Small teams of students are set up, and they carry out the projects in accordance with Scrum guidelines. One of the team members serves as the Scrum master for each team, while the teacher typically assumes the role of product owner.

Scrum was also successfully used as a management and instructional technique for transdisciplinary education [24, 25, 26]. Gestwicki and McNely collaborated with designers of user interfaces, artists, and programmers to create six different educational gaming projects [27]. They collaborated with one or more academic mentors and community partners from outside the university. The students were from a variety of degree programs.

According to several studies [28, 29, 30, 31, 32], Scrum has been used to teach various disciplines. In a university course on discrete mathematics, Duvall et al. implemented certain Scrum-based classroom management strategies in an effort to encourage students to take more ownership of their education [33]. The teams of pupils took pleasure in organizing and directing their own learning.

Teams could choose from traditional or interactive online textbook reading, lecture-based learning, online video learning, or a combination of these. The professor could monitor the team's progress toward self-selected milestones since they each maintained a project management progress board. Along with the solo work, there were a few standard lecture sessions that felt more like group conversations to the students. Grimheden also looked into using Scrum to teach mechatronics, which is an integration of software engineering, mechanical engineering, electrical engineering, and control engineering [34]. They demonstrated that, when compared to other methodologies, Scrum enables students to provide results more quickly, consistently, and with superior quality.

Transparency

Those in charge of the outcome must be able to see important components of the process. In order for spectators to have a shared understanding of what is being viewed, transparency necessitates that those elements be defined according to a common standard. For instance:

- All participants must speak the same language when referring to the procedure; and, The definition of "Done" must be the same for both individuals doing the labor and those receiving the finished output.
- The goal of eduScrum is to add value, which is the culmination of each student's individual learning outcomes, personal growth, and group accomplishments. The goal of the eduScrum framework is to support learning by bringing transparency to the aforementioned topics. For students to maximize their learning potential, transparency is vital to assist them in making the best judgments during the learning process.

Inspection

Users of eduScrum must often review the software's artifacts and their progress toward Learning Objectives in order to spot any undesired deviations. Their examination shouldn't be conducted so frequently that it hinders their ability to do their job. When teachers and students actively carry out inspections at the place of the work itself (the classroom or practice area), they are most beneficial.

Adaptation

The planning or approach must be changed if a student (or teacher) concludes that one or more process elements pose a risk of deviating outside of acceptable bounds and/or that the outcomes will be unacceptable. As quickly as feasible, a correction needs to be done to reduce additional departure. According to the eduScrum Events part of this paper, eduScrum specifies six formal events for inspection and adaptation:

- Team Formation;
- Sprint Planning
- Standup (at the beginning of each class)
- Sprint Review (experiment, test, oral or written presentation, or a mix of these); (functioning of team and team members)
- Self-Reflection (personal)

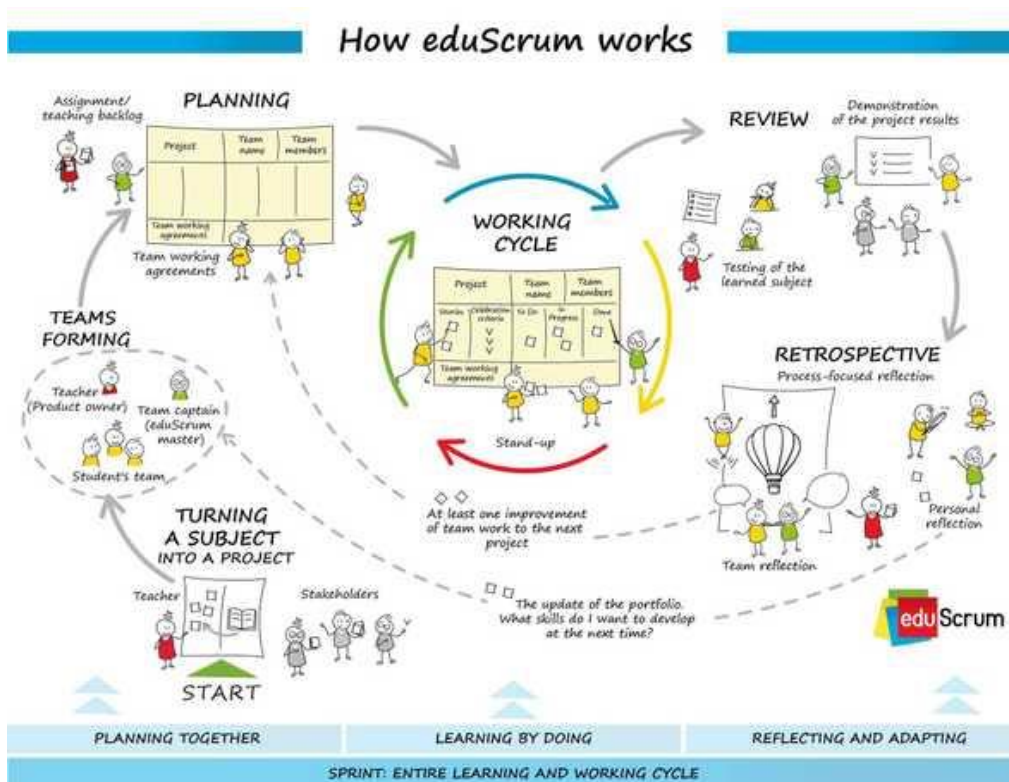


Fig. 2. How EduScrum Works

4 Conclusion

The world of Agile techniques is investigated, with a focus on how well they fit into the educational setting. The concepts, ideas, and best practices behind Agile and its derivatives, such as eXtreme Programming and Scrum, are also upheld in the classroom, where the importance of people is highlighted.

According to the stated experiences, Agile can be successful, particularly in situations where active and project-based learning can be used. Agile may be used to educate a variety of subjects in addition to software engineering courses. Kanban boards and other Agile tools, for example, can be used as learning aids.

When Agile approaches are used for learning and teaching, information transfer is transformed into knowledge produced through extensive collaboration and experience. For students who are self-directed learners, teachers take on the roles of facilitators, coaches, and motivational servant leaders. Instead of placing an emphasis on rigid planning, flexibility is needed to account for students' input and their various abilities, interests, difficulties, and experiences in order to uncover their untapped talents and passions. Delivering the highest value is prioritized in terms

of discipline-specific learning outcomes as well as soft skills like collaboration, planning, organization, and cooperation.

Willy Wijnands developed the eduScrum framework in 2011 to provide students control over their own learning. They are given the responses to the questions "Why?" and "What?" but are given the opportunity to discover "How" they will accomplish their learning goals. Transparency, Inspection (Review), and Adaptation to Learn are the three pillars of eduScrum, which is built on Scrum and founded on empirical research. The Teacher (Product Owner/eduScrum Master), The Team Captain, and The Student's Team are the eduScrum positions. Sprint, Sprint Planning (Team formation, Learning Objectives, Work Planning), Standup, Sprint Review, and Sprint Retrospective are the ceremonies/events that make up eduScrum (Team evaluation, Personal Reflection). The Flap - eduScrum Board, the assignment's content (stories with Celebration requirements), Definitions of Doing, Communicating, and Having Fun

This analysis of the literature demonstrates that there is significant interest in both studying and using Agile learning approaches to enable students to collaborate in a positive, focused, and efficient way. Researchers are actively working to formalize agile approaches in the context of education, such as eduScrum.

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