



Teaching Agile in Schools: The Triumphs and Enlightenments

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Agile is simple. Just four statements in the Agile Manifesto. So, teaching Agile in schools should also be simple, right? Not so fast. I wish I could tell you that this effort was a piece of cake, but that wouldn't be completely transparent. This talk will share our journey, triumphs and enlightenments and how we adapted along the way.

I am lucky enough to work for Capital One. This organization believes in not only pushing ourselves to excellence, but also staying in touch with the community to improve the surrounding area. In my giving to the community, I joined a volunteer initiative called Agile for Learners as the Student Lead to bring Agile into the classroom. This was a no-brainer for me, as it satisfied two of my passions: meaningful volunteer work and Agile.

To set the stage, you need to know that I LOVE Agile. I love its simplicity, honesty, practical application, and the fact that it embraces change. During my career, I have held numerous positions that focus on the interactions between technology and business, and I have done so working on both sides of the aisle. I have served as a business analyst, a business manager, a project manager, a release manager, and a scrum master. I like to say that I speak both business and technology. Through my years of experience, I have come to appreciate that Agile provides the easiest and best approach to delivering value quickly. And it is FUN. Working on a collaborative team that is empowered to develop the best solution should be fun. If you're not having fun, something is wrong!

1. PILOT #1: 9TH GRADE STUDENTS AT A LOCAL TECH-BASED HIGH SCHOOL

1.1 Session One

I learned about the pilot for the Agile for Learners volunteer program at Capital One that included meeting the needs of teachers and students. I knew right away that I wanted to be involved. Unfortunately, I had to be out on medical leave, so was not able to participate in the initial planning. Once I returned from medical leave, I volunteered to be one of the mentors for our first pilot with a local high school. The first session relied on a lecture-based format. It turned out to not be as conducive to learning as we would have liked. The students were not engaged and, more importantly, not having a good time. This hurt me more than anything because, as I mentioned previously, I love Agile, and I know it to be fun.

OBSERVATIONS:

- Students were not engaged with the lecture-style format
- There were way too many students in too small of a space

ENLIGHTENMENTS:

- Appeal to your audience or you will lose them!
- Logistics will kill an otherwise good presentation

ADAPTATIONS:

- Split the students into two groups and into teams for next session
- Changed the format for the next session.
- For future pilots, we dictated a maximum number of student participants in each session and provided guidance on best team size to the teachers who were assigning students into groups
- Met with school prior to the next session to work out the logistical issues

I attended a retrospective after the first session, eager to help make the experience better. We decided, based on feedback and observation, that a more experiential-based approach was needed. Since this is near and dear to my heart, I volunteered to be the Agile for Learners Student Lead and revamp the sessions to be activity-based. We had three additional sessions scheduled with the high school to accomplish our goal.

My journey begins....

I must admit I didn't fully understand what was ahead of me or the amount of effort it would take. What I did know was that I had two weeks to create enough material for the next three sessions to make it more valuable and engaging for the students. Where to start? Luckily for me, I had a little help from my friends. The Agile for Learners Core Team provided me with the lesson plans from the teacher sessions, which already had planned activities. I borrowed from an in-house developed curriculum that utilized Legos for activities that we used to introduce Agile to our interns. And I inherited a draft lesson plan that had been developed for the students by another Core Team member. So, with a lot of late nights and reviews and revisions with the other Core Team members, I created materials for three additional sessions that included activities for our remaining sessions with the school. Did I mention this was stressful? I can't even begin to tell you how many hours I put in to develop the additional sessions. And to gather and create the materials needed for the activities. And to figure out and coordinate logistics with the school. And did I mention that I had a day job? I was excited, energized, exhausted, worried, and stressed out all at the same time!

1.2 Session Two

In Session Two with the students, we changed our approach to deliver overview materials to all the students simultaneously, followed by team activities. We staffed this session with two co-presenters for the entire group and two volunteer mentors for each team. We concentrated on team forming and creating a demand for Agile. The students were grouped into teams that were pre-assigned by the school. Many of the students did not know each other well. To help them get to know each other, we engaged the students in an ice-breaking activity within their team and had them work together to select a team name.

Now that the students were more comfortable with their teams, we introduced a "Design to Fail" activity to create a demand for Agile. Of course, we didn't share with the students that it was designed to fail! We gave each team Legos and a set of requirements to build a student campus to include such items as classroom buildings, a gym and a treehouse. The students were so excited to play with the Legos (who wouldn't be?). Unfortunately for them, there was no real detail in the requirements. And we didn't even talk about how they should work together. And we didn't give them enough time to come anywhere close to completing the assignment. Once the activity ended, we did a retrospective with the students. They students identified all their frustrations with the activity. Perfect! They understood that they needed a better way. We then showed the students a short video on a better way to work using scrum. And we left them wanting more. The stage was now set for the next session. At the very end, we collected anonymous feedback from the students using Mentimeter.

OBSERVATIONS:

- We lost time with every activity getting the students to switch focus from team to the presenter and ended up having to rush through some of our materials in order to end on time
- On the other hand, the students themselves provided feedback that they enjoyed the new format, activities, and having mentors assigned to each team
- And they enjoyed having mentors assigned to each team

TRIUMPHS:

- The students loved the Legos, which lead them to be very engaged in the activities
- The students enjoyed their volunteer mentors, especially those who were software developers.
- We were successful in creating a demand for Agile. The students already understood why they needed Agile anyway.

ENLIGHTENMENTS:

- Logistics matter. Need to control the environment so that learning and fun can take place.
- Make sure to allocate enough time for students to complete the activities and have meaningful conversations after each activity.

ADAPTATIONS: Allotted more time for activities and discussions for the next session by eliminating some of the less relevant materials.

We were much more successful with this session. All my worry, stress, hard work and late nights paid off! Thank goodness! If it hadn't, I'm not sure I would have been able to continue.

1.3 Session Three

In Session Three, we asked the students to make sure they were seated with the same teams as the last session. There were problems here. Not all of the same students were in attendance. There were some teams with additional team members and some with not enough team members. It turned out that there was another course being offered at the same time that some students needed to attend. So, we made adjustments; and lost a little bit of time.

Once we got situated, we reviewed the previous session's retrospective to remind the students why they needed Agile. We then showed them how to create a Trello board for the team to use to collaborate (the students really enjoyed this part!). The remainder of the session was spent learning to add backlog items, prioritize, and refine those items on the Trello board. We used the same requirements from the "Design to Fail" activity in Session Two but did not try to build anything. The students missed playing with Legos. I assured them that the Legos would make a comeback in the next session.

OBSERVATIONS: Logistics again. Need to be able to minimize changes to the team composition so the team can successfully build on what they did in the previous sessions.

TRIUMPHS: The students loved Trello and were very engaged

ENLIGHTENMENT: The students loved Trello too much! Many team members were engaged in changing the background and other customizations in Trello instead of focusing on the activities.

ADAPTATION: In future sessions, we plan to work through the activities first on a physical board and then introduce Trello and allow students time to have fun with it. They would still get the benefit of learning a tool to help them manage their backlog, but it would not be quite so distracting.

1.4 Session Four

We brought back the Legos! We introduced the scrum events of planning, sprinting, demoing and retrospectives. Then, students executed two sprints, incorporating into the second sprint the improvement items identified in the first sprint. They were inspecting and adapting!

OBSERVATIONS:

- Students loved building with the Legos and using Trello
- Students didn't get as much time as they would have liked in actually building with the Legos

TRIUMPH: Students acquired basic Agile skills that they could put into practice.

ENLIGHTENMENT: Don't skimp on the time allocated to activities and retrospectives. This is where the real learning takes place!

ADAPTATION:

- In future pilots, we eliminated some of the less-relevant content to allow additional time for activities and retrospectives
- Additionally, we built in some buffer time to allow for transitions

As a reference, here is what we covered in each session:

Session #	Content	Activities
Session 1	Agile Overview	
Session 2	Form Teams Create Demand for Agile	Ice Breaker Lego Design to Fail Activity Retrospective
Session 3	Review Retrospective Add backlog items Prioritize Backlog Refine Backlog Estimating	Trello
Session 4	Planning Sprinting Daily Standup Demo Retrospective	Trello Building with Legos
Celebration at Capital One Campus		

1.5 Campus Visit

For the grand finale, we invited the students to visit the Capital One campus to get a feel for what careers are available to those interested in Software Engineering and how Agile is used in that role. They were given a tour of campus, fed lunch and given a bag of Capital One swag. I have to tell you that our campus is pretty amazing. It is very much like an upscale college campus with plenty of amenities. Students saw our basketball court, lake, and treehouse, complete with wi-fi. Students heard from our interns, software developers and leadership. Most importantly, they heard that every software development team works in Agile. What a fun day!

TRIUMPH: Students got a real-life view of careers that use Agile on a daily basis. Agile was no longer just something they studied.

1.6 Final Retro

Our pilot with the school was complete! All except the final retro with the school. The retro with the school was revealing (as every retro should be). And led to the following:

OBSERVATIONS:

What were we trying to teach the students? How to become scrum masters? Is that what they really need? No. What do they really need? How to be successful in project-based learning, especially when working on a team project.

TRIUMPH: The students had fun, learned some Agile and the school wanted us back for the next year!

ENLIGHTENMENT: We needed to change our focus from teaching students how to be scrum masters to how to use Agile tools and framework to be successful in project-based learning

ADAPTATIONS: In future sessions, we refocused the content to support project-based learning

Time to take a breather and begin to review our materials for the next pilot, whenever that is. But wait! The next pilot is in just two months. And the audience is middle school students. I don't really have all that much time to get my act together. So much for taking time to recover! In addition to revamping the curriculum to be project-based and appeal to a younger audience, I need to recruit volunteers, create materials and work out all the logistics. Panic begins to set in!

ENLIGHTENMENT: A volunteer team, just like any Agile team, needs to maintain a sustainable pace.

Luckily for me, I was able to recruit another Agile lover to help me revamp the curriculum. I had an idea that we could create modularized sessions that encapsulated desired outcomes in easily digestible chunks of up 90 minutes each. This would allow us to better plan and execute future pilots. Here is what we came up with:

Session	Content	Comments	Activity
1 st Session	Teamwork/Norms	How to work in teams Team forming Choose team name Team norms	Airplane game, choose team name
2 nd Session	Design to Fail Exercise	Creates the demand for framework	Lego Campus
3 rd Session	Define and Visualize your Work	Create backlog of user stories Prioritize Estimate	Dog estimating spaghetti dinner backlog
4 th Session	Let's add Structure	scrum roles, planning, sprinting, standup, review, retro, small batches	Lego Campus

2. PILOT #2: 5TH GRADE STUDENTS AT A LOCAL MIDDLE SCHOOL

2.1 Session One

Before we knew it, it was time to execute on the next pilot. I arrived with my volunteers and materials at the middle school for our first session. The students were already seated in their teams and eager to begin. You could feel their excitement. This was a class of advanced students, so what could go wrong? We had this idea that we wanted to measure whether or not the students actually understood the concepts being presented, so we would give them a pre-test and a post-test and then compare the results. I explained up front that it was not a test of them, but of our program and the students should not put their names on the papers. As we passed out the test, I could feel the energy in the room changing. Many students were obviously anxious. What had started out as excitement had turned into dread. I was losing them, and we hadn't really even started! What happened? I later learned from their teacher that many of the advanced students had such a drive to excel that they were upset when they didn't know the answers on a test.

After such a rough start, I was worried that I would not win the students back. I needn't have worried, though; hardly anyone can resist the airplane game. I have seen many variations of the airplane game. Still, for this audience, I wanted to stress that the teams themselves will discover the best solution for them and that the solution that works best for one team may be different for another team. Once we started the activity, the students became very engaged and excited. The decibel level in the room was so loud that we had to shut the door so as not to disturb the other classes!

How to play the Paper Airplane Game

1st iteration: I advise the students that I am the best at building paper airplanes since I have been doing it all my life and I will give them instructions on how to build the best airplane. And I mean exact instructions. Which team member will make which fold and then pass to the next team member to make the next fold. The last teammate tests the airplane by flying it across a line on the floor some distance away. The team keeps track of how many airplanes passed the test. We give them about 3 minutes for this.

And then, we asked the teams to think about how their team could improve upon the process I had given them. The only process they could not change was how to test the airplanes (they had to fly across the same line).

2nd iteration: Teams were given a few minutes to decide how they should build the airplanes. Ready, set, go.... Teams were given another 3 minutes to build and test airplanes, keeping track of how many airplanes passed the test.

How did this compare to the first iteration? Can they think of any improvements they might make the next time they build airplanes?

Back in the larger group with all teams, I asked them what they learned from the game. There were lots of good learnings around working together and communicating. I asked each team what process they ended up with to build the airplanes and then pointed out to the students that, while each team might have a different solution, the solution they each developed was the best solution for that team. I also admitted that maybe I was not the best person at building airplanes; they were!

The remainder of Session 1 focused on team-building activities such as choosing a team name and creating team norms. We concluded a successful session and left the students wanting more.

ENLIGHTENMENT: Don't create anxiety in your audience!

TRIUMPHS:

- Students had a good foundation for how teams work together to solve problems!
- Students were inspecting and adapting without even knowing it!

ADAPTATION: In the next iteration of the pilot, we replaced the test with a Kahoot! game at the end of each session. This provided a fun way for the students to demonstrate their learning and appealed to their competitive nature.

2.2 Sessions Two through Four

In session Two, we introduced the same Design to Fail Lego activity that we used with the high school students. And had pretty much the same outcomes. Students were frustrated with not being able to complete the Lego activity and then we introduced scrum.

In session 3, we introduced the students to a physical board instead of Trello. We prepared story cards for the Lego activity and had them estimate using dog-themed poker planning cards.

Session Four was about building the Lego campus.

OBSERVATIONS:

- We added some new presenters, and those presenters really grabbed the attention of the students
- We still had difficulty fitting in the planned materials and devoting enough time to activities
- Students and volunteers alike had a lot of fun

TRIUMPHS: The students understood the materials and had plans to incorporate what they learned into their group projects!

ENLIGHTENMENT: We needed to bring the vocabulary and activities down to the student's level. We spent a lot of time rephrasing on the spot.

ADAPTATIONS: For the next pilot with middle school students, we revisited the vocabulary and examples to simplify them

I was feeling pretty good after this pilot. Our content was in a pretty good place, and we had very little massaging that needed to be done. We were finally in a place where we had a repeatable process. The remaining pilots would require much less effort on my part. Or so I thought.

Along came COVID. It turned everyone's world upside down; the schools were doing virtual learning, and Capital One teammates were working from home. I half hoped we would delay any additional pilots until everything was back to normal. But that was not to be. In fact, we had another pilot beginning in early January.

There were so many challenges to be overcome. How would we share materials with the students so that entire teams could collaborate virtually? How would we overcome the technology requirements of both Capital One and the schools so that we could be secure? How would we rewrite the course content and activities for a

virtual delivery? How would we staff volunteers? How would we train volunteers? Who could facilitate running the zoom meetings?

The other members of the Core team helped and resolved many of these items. Unfortunately, the timing sucked. It turned out that just about everyone but me was on vacation the last two weeks of the year. Since it was usually quiet at Capital One at the end of the year, I typically use this time to catch up on my certifications and trainings. But that was not to be. Once again, I was stressed to the max. Once the other core team members were back from holiday, they pitched in to make everything work, but it all felt very haphazard and rushed.

ENLIGHTENMENT: Carefully plan with all impacted team members before committing to engagements.

3. PILOT # 3: MIDDLE SCHOOL STUDENTS & VIRTUAL LEARNING

We kicked off similar content as before, but virtually. To be honest, there were lots of technology issues on both sides at first. The students and teachers had to join both the virtual classroom and then the virtual meeting where we would be presenting the content. Most sessions did not start until about 20 minutes into the scheduled start time. Additionally, it took some time to get everyone familiar with the virtual tools we were using and on how to join breakout rooms.

But we persevered. And the students took away some learnings on how to use Agile tools and techniques to make their projects more manageable and successful. After each session, we held retrospectives with the volunteers and the schools. We inspected and adapted along the way, the sessions got better and better, and the students benefited more and more from each session.

Even so, I can't wait to get back to in person learning!

4. SOME CONCLUSIONS AND ACKNOWLEDGEMENTS

The moral of this story is that teaching Agile in schools is not an easy task. But it is a rewarding one. With some careful planning, execution, learning, and adapting, you can share valuable tools with students in your community. And, while you are at it, receive value yourself.

Even if you don't take up teaching Agile in schools, there lessons in here that you can learn from and apply to your circumstances.

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