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An agile approach to reflecting on teaching and learning practices

Aim of the Project

The number of academics in the various Information Technology (IT¹) disciplines across Southern African Higher Education Institutes (HEIs) holding formal teaching qualifications is quite low as attempts to fill lecturing positions at HEIs with professionals possessing formal training in both a given discipline AND teaching remains challenging. The lack of teaching training is concerning as a subject specialist is not always necessarily a good teacher as teaching requires different types of knowledge that extend beyond a discipline's subject matter. Shulman (1986) puts it succinctly, "[t]hose who can, do. Those who understand, teach."

Action research is seen as one way in which academics are encouraged to develop their teaching and learning practices (Mertler and Hartley, 2017) where participants systematically refine methods through multiple action, evaluation, and critical reflection cycles (O'Brien, 1998). Since problem-solving is highly prevalent in IT, academics in this space should in theory, find this systematic development to be second nature.

This project investigated how IT academics can tap into an existing practice to systematically improve teaching and learning.

Processes / Methods

The project followed the design science methodology as described by Peffers, Tuunanen, Rothenberger and Chatterjee (2008) with the objective of developing an artefact that fosters the development of good teaching and learning practices (through action research) amongst academics in the IT discipline.

¹ This term is used to refer to the disciplines (Computer Science, Software Engineering, Information Science, etc.) normally associated to Information Technology.

A literature survey was conducted to identify existing IT practices that mirrored or held similarities to the action research cycle. The Manifesto for Agile Software Development demonstrated the most promise based on its principles that emphasise prioritising customers and change (Beck et al., 2001). Primary selection criteria included the consideration that student needs should be prioritised, and that academics should work with the ability to assess and adjust their introduced changes sooner.

Whereas the more traditional (Waterfall) model produced outcomes that could only be seen at the end, Agile promotes the release of tangible outcomes that permit for frequent feedback and change. Furthermore, Agile exhibits another benefit for developing teaching and learning practices, namely "...uncovering better ways of developing ... by doing it and helping others do it." In this way, the Agile mindset shares best practices, an activity that helps to promote communities of practice (CoP).

The Agile system development lifecycle was adapted to fit the action research cycle in teaching and learning, resulting in the Agile Teaching and Learning (AgileTL) framework. Figure 1 below illustrates three such AgileTL cycles (note its similarity to action research).

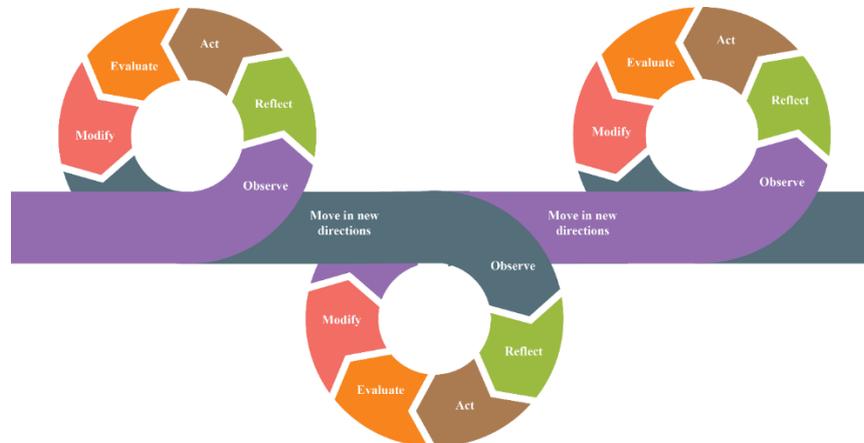


Figure 1: The AgileTL process

The concept of AgileTL was validated through peer-review at the Southern African Computer Lecturers Association 2018 Conference (attendees included academics and teachers sharing the common interest of teaching and learning in the IT discipline).

In 2019, AgileTL was implemented in several areas as an attempt to improve teaching and learning practices in my department, specifically, to activities involving

the Informatics 3 Team Projects where teams are required to design and develop a full software system. These projects are compulsory and students who fail the project tend to fail the modules as well.

Each project team is assigned a project mentor (with varying levels of experience) to receive guidance. Team mentoring can be challenging as no two teams are alike in personality, skills, and project. Project mentors must be adaptive and cognisant of their team’s needs. The follow scenario describes how AgileTL was implemented:

- *Observe* - **F**² is the lecturer for the first semester and project co-ordinator. Having done this for several years, **F**^{*} has identified what they believe to be stumbling blocks to success in the module (and by extension project).
- *Reflect* - **F**^{*} runs through the following two proposed changes with myself **C**^{*3}, the second semester lecturer

Proposal	Rationale
Teams must reiterate their problem statement for the project frequently.	Teams will focus on what their projects should be doing, increasing clarity and avoiding scope creep ⁴ .
Increase accountability amongst students in each team.	Team projects may lead to potentially uneven distribution of work carried out. Students may be encouraged to contribute more equally if each team member must account for their contribution.

- *Act* – In January 2019, **F**^{*} hosted a workshop⁵ for 12 project mentors. During this workshop, **F**^{*} explained their changes for implementation in 2019: 1) mentors had to ask teams to reiterate their problem statement for each deliverable (students would thus also apply the principles of AgileTL as they would be adding to and adapting their project’s functionality as they learnt more along the year); 2) teams must assign tasks and update their progress as they worked on their deliverables via a Kanban board⁶ which served as a monitoring mechanism for all involved.
- *Evaluate* – The Kanban board provided students with a visual idea of their progress on the project while mentors would be able to see if their current mentoring strategies were working (or if it required change). This would in theory provide **F**^{*}

² Anonymized for ethical purposes.

³ Anonymized for ethical purposes.

⁴ This refers to changes or growth in a project that typically occurs when the project is poorly defined. This often leads students to attempt implementing features that do not contribute meaningfully to the overall project, wasting their already limited time.

⁵ Unfortunately, this workshop coincided with TAU Contact Session 3 and I could not attend as a result.

⁶ Kanban boards are tools used to visually represent the progress of processes using cards placed in columns representing their current state (e.g. In Progress, Complete, etc.). More on this topic can be found at <https://kanbanize.com/>

with a mechanism for better monitoring student accountability. At the writing of this report, two deliverables had submitted. I interviewed ten of the mentors, mainly to assess how AgileTL had been perceived. Mentors were interviewed using a standard set of questions with the possibility of pursuing additional avenues of query based on feedback. Mentors were asked to be frank about how they experienced the changes to mentoring this year. I summarised and presented my findings to F*, who, in conjunction with the results of the deliverables and assessment results thus far, evaluated the outcomes of the proposed changes. Overall, mentors noticed a general improvement amongst teams in the understanding of their projects⁷. Not all students made use of the Kanban board with most mentors reporting that some teams are not using them at all while others used them incorrectly. Mentors are of the belief that the Kanban board will only add value once students work on the actual programming (for the first two deliverables, teams were working only on design documentation).

- *Modify* – F* noted that a different approach may be required to improve accountability on the design portion of the project.

Outcomes

Some mentors applied agile principles to share their best practices with one another at least once a week in an informal fashion while walking to buy lunch. This regular, brief reporting is what typically takes place during a Scrum⁸ meeting. It was noted that mentors adopted proven practices shared by others in this way and sharing of teaching and learning solutions are more commonplace this year.

At present, AgileTL has only been applied to a limited degree by academics within the IT discipline although there has been some interest by academics on an individual level in applying it to their lecturing in the second semester.

Further to this, academics from other departments within the Faculty of Science will be invited to participate in this project to generalise AgileTL for use in other disciplines beyond IT. It is envisioned that this will be done in 2020 and beyond, starting with members of the Faculty of Science's Teaching and Learning Committee.

⁷ We are waiting for August 2019 when an external moderator gives us input on assessing student understanding of projects. This moderator evaluated the projects last year and would therefore be suitable to provide a comparison in assessing if there are improvements from focusing on the problem statements this year.

⁸ A form of Agile.

References

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