

Applying Agile to Instructional Design

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Abstract – This paper discusses the challenges and strategies of applying the agile mindset in an academic environment. Both cultural implications and quantitative results are discussed. The journey shared provides insights for non-software industries on how agile is not a set of rules with rigid tools; rather, it is a philosophy with a need to understand the intent of the tools in order to identify the appropriate application for not just effective results, but maximally effective results with a mindset for continued change.

Keywords-instructional design; curriculum development; agile; kanban; scrum; lean

I. INTRODUCTION

Agile in a university setting can sometimes be an oxymoron. However, it can successfully occur within university administration, as I have personally experienced. Specifically in the context of the online education team, agile tools were adapted to give curriculum designers increased productivity and improved motivation. This allowed the designers to provide better quality and cutting edge courses in less time. The online educational team implemented and shared a personal kanban, dropped job descriptions, and saw massive improvements throughout. Scrum was then studied, dissected, and reassembled for our needs. Previously, writers demonstrated frustration in understanding expectations and direction. Writers are now asking regularly to write for us, while designers have more free time for adding new dimensions to the curriculum in addition to normal expectations.

Given the cloak and dagger nature of academia, the new focus on transparency has produced a huge cultural improvement of replacing defensiveness and fear with positive motivation and creativity. However, besides cultural improvement there are some quantitative facts that point to the success of agile utilization, at least in my particular department of online education.

II. UNIVERSITY SETTING

Traditional education has a very specific target audience of students within a certain age range that have the financial capabilities of being able to focus on studies essentially in an environment that is self-sustaining without the added expectations of family and career. It is my absolute belief as an educator that there is a time and place for every type of education, but also that traditional environments have

limitations that do not address the needs of much of the population. Accelerated education targeted to adult learners has its own set of limitations, but in this context we cannot compare apples and oranges with two entirely different end goals and target audiences. Online education is an approach to learning that occurs in both traditional and accelerated environments, but the context of this paper focuses on the academic environment for adult learners. Ohio Christian University supports traditional and adult learning, with the latter being in an accelerated format of a pre-set course sequence in order to achieve a chosen degree program. The courses are provided in short and very intense bursts of knowledge construction based on experience and collaboration.

Regardless of environmental differences, it is typically difficult to entice higher education faculty and staff to embrace new ways when it would appear that the current way seems to work just fine. Identifying wastes can be difficult because once cultural norms develop within work flows, the idea of dropping a component is extremely challenging. Departments are generally overstaffed and over-plan major projects with decisions easily micro-managed. Project management often requires holistic awareness of all requirements in the beginning, so adjustments are extremely time consuming with errors compounding. If this sounds familiar regardless of industry, that's absolutely correct. However, education certainly is a leader in the establishment of complicated hierarchy and often represents an antonym of transparency.

III. LITERATURE REVIEW

There are a few invaluable pieces of literature and individual resources that contributed to the gradual integration of agile methodology within Ohio Christian University's online education. Frankly, I had little caring about the agile philosophy and was looking for a tool that would be inexpensive for my team to coordinate across several states and have real time updates. The discovery of an online personal kanban board was the simple and obvious resolution. The problem was solved...except that its implementation kept identifying gaps and wastes in my beautiful world. Encouraged by others to attend Scrum Beyond Software 2010 hosted by Tobias Meyer, my final skepticism was defeated and agile concepts left the closet for good. After experiencing a Scrum workshop, it was encouraging to realize that not only did we have natural aspects of agile philosophy already in use, the answers to

some of the identified wastes in our curriculum development process were well on their way to being identified.

The book by David Anderson [1] clearly has a focus for software solutions, but many of the principles apply outside of the industry. While it is not introductory for those unfamiliar with agile, past familiarity with management techniques and long discussions with Eric Willeke, Agile coach, made this book the reason that I state the need for understanding that the *intent* of the tool is essential in order to implement them for maximal effectiveness.

My introduction to Jim Benson [2], co-author of the recent personal kanban publication also contributed strongly to the continued growth of our efforts to effectively apply agile, as well as clearly differentiate Kanban, kanban, and personal kanban; an invaluable insight for effective kanban management. This book is perfect introduction on developing the appropriate mindsets needed for task mapping and flow, especially for departments that do not necessarily contribute to the same tasks, but need the transparency to be more effective in their own tasks.

Michael James [3] directly impacted the awareness of our move from a waterfall technique to agile development. While attempts to transform had already started, this reference document in combination with the Scrum Beyond Software 2010 workshop removed at least months of trial and error transformation.

IV. APPLYING AGILE PHILOSOPHY

Individuals that work in a remote environment and clearly produce are already self-organized at least in context of their work and collaboration with other team members. However, in our group time was still often wasted with ineffective results without specific tools that allowed each member to clearly understand and *see* short-term goals in relationship to long-term needs. More will be discussed on this particular topic, but once we combined our personal kanban boards into one view, each member could easily improve productivity because tasks became efficient with real knowledge of the task relationships rather than being told to perform a task without context and perhaps producing it with a different intent than originally planned. The ability to see each member's progress and contributions provided immense motivation that ensured each individual was not isolated in his or her work and had a better sense of security with those contributions. Lack of context often keeps people quiet because they do not want to appear silly or there is a bluster effect that merely raises defensiveness and creates a stronger isolationist environment. Implementing the agile philosophy of sharing and contributing in a completely open environment has created the ability for production to become much more effective while providing a sense of value for each team member.

A. *Impact of Lean Approaches*

Lean concepts are relatively foreign to the academic world of university life. However, the element of developing

accelerated adult focused degree programs has many more possibilities due to the nature of being run more like a business. Wastes are more naturally excluded from the process because the accelerated courses combined with a pre-set curriculum model cannot support the overhead that has developed over time with traditional education. Also the target audience is very different in that accelerated programs focus on working adults that are motivated to immediately apply their education to their career efforts through peer sharing and collaboration instead of the younger generation of students that do not have work experience and often are not goal oriented.

Despite the fact that accelerated education for adults naturally tends towards lean concepts, there is still a tendency to manage with a hierarchical structure since that is historically how academics have been handled. Just as the lean manufacturing framework is too often forced onto knowledge work without the appropriate adjustment for the high variability involved with knowledge work, accelerated education tends to take the hierarchical framework of traditional education and force it onto a model that cannot survive without significant adjustment.

I had the good fortune of being invited to join a start-up online program that had no developed curriculum or tools to develop said curriculum. The initial contract was to develop the curriculum for an Associates of Arts in Business Management and an Associates of Arts in Christian Ministry simultaneously, with the Bachelor of Arts for each major following suit. These courses were 3-6 weeks long depending on credit hour value and cohorts started every other month.

The first technique applied was just-in-time (JIT) development, discovered through the manufacturing concepts of lean in combination to the application of JIT in education [4]. However, JIT started crippling the development efforts due to the extensive time involved with designing each piece of the curriculum. The industry standard for curriculum developers that is increasingly found wanting due to its lack of practical application to real world situations is a methodology called ADDIE [5], and represents Analyze, Design, Develop, Implement, and Evaluate. It strongly correlates to the waterfall approach where the course must be understood at all levels in the beginning. Errors discovered in implementation and evaluation can completely unravel the entire course depending on the severity and complexity. ADDIE is considered by instructional designers to be flexible, but in reality it wastes time and money by dragging problems out and creating an environment of pressure and lack of creativity.

Additionally, the variance of experience for the contractor writer, or expert, caused significant delays. The designer takes the entire journey of the degree program, but the subject matter expert (SME) is only contracted for a specific course representing his or her expertise. This

requires re-training for each SME as the designer determines and adjusts to the comfort level of the process. Often, the more experience a SME has in developing curriculum, the more difficulty he or she has in accepting the opinion of a mere designer who is not familiar with the content. The flip side of the coin is the inexperienced SME who is passionate about the content, but terrified of the process and has difficulty moving forward. After a few miserable experiences with this process, it did not take long to realize that the challenge was the lack of structure and too much wasted time across the “analyze” and “design” aspect of the ADDIE method. The worst situation that occurred often was that after the long and arduous development, the approval committee had structural complaints, but in order to fix the problems, the entire course unraveled. Finally, if a SME abandoned the project, it was almost impossible to salvage enough material to prevent starting over.

Rapid prototyping is an accepted improvement to the ADDIE model and acknowledges the need for interactive feedback, but still lacks the structure for developing JIT curriculum effectively. I had no idea what lean or agile was at this time, but something had to change immediately. Several duplicative components of the process were cut out and I created a short video walking the SMEs through the process, but this clearly did not fully satisfy the situation since hours of guidance and questions occurred with each writer, despite the attempt to train them before they started. Shockingly, like the students for whom we were writing the curriculum, they simply would not read it or did not find the immediate relevance to their goals. The development schedule was often disregarded and my role as designer quickly disintegrated into the expertise of nagging, and then begging, with little or no time to truly review the design. This unfortunately resulted with producing curriculum that displeased me, but time is unforgiving. Two more struggling years went by before Scrum was introduced to me. While there is no special name for it other than “our new agile method”, we have completely changed the face of our curriculum design process with four simple stages.

- Framework Stage – this stage involves the development of the course objectives, course description, resources, and weekly objectives. There is a very clear taxonomy, general steps to create objectives, and examples for each level of learning.
- Fulfillment Stage – upon approval of the previous stage, this involves the development of how the weekly objectives will be fulfilled, with the requirement to explain the relevance of the recommended activity. The details of the activity are not completed, but simply another layer is added to the framework. The workload and diversity becomes evident in this stage before committing to the activities chosen. A list of relevant activities for adult learners is provided for selection by the SME.
- Completion Stage – upon approval of the previous stage, the structure developed so far is put into a

finalized curriculum template for the SME to flesh out the details for activity management and provide additional information to support the course in general.

- Support Stage – everything is done! This stage is merely a review and editorial pass. The syllabus is already a template to a major degree with only the need to list activities in a table with the point values, and adjust the points in the rubrics as needed.

Each stage experiences the Scrum two-week iteration unless previously discussed with the SME. This has resulted in a multiple month-long process (depending on the SME’s motivation) being reduced to an 8-10 week structured process. The true sign of it being an agile tool is at any point in the new development method, the course can be offered, where ADDIE-developed courses cannot be offered until they are wholly completed. While the expertise and experience of the instructor would have to be greater in ratio to fewer stages being completed, the most basic framework created in the first iteration is enough to offer the course if absolutely necessary. If a SME abandons a project, absolutely nothing is lost and the stages currently completed can be immediately transferred to another SME. Now, multiple degree programs and sub-concentrations are being developed at a rapid clip producing excellent courses, older courses are being constantly updated to keep the curriculum content current, social learning and social media is implemented, and faculty are rigorously mentored and trained in online open-space environments by the two designers on staff. The ability to manage all of this is due to the agile method not only being applied to the curriculum development, but also in the tasks involved with maintaining an entire online paradigm for a university.

Moving away from just curriculum design for a moment, we had departmental challenges as well. The start-up from two associate and two bachelor degrees quickly blossomed into a new concentration within an existing associates program, two new concentrations within an existing bachelors program, three entirely new bachelor degrees, and three new master degree programs. Additionally, once curriculum is written, there are a number of circumstances that occur to require edits. The more an institution desires to have cutting edge curriculum, the more effort is required of the instructional designer to continue improving knowledge and understanding in instructional, social learning, and motivation strategies that directly impact the quality of curriculum maintenance. Adjunct faculty has grown from a couple dozen to a hundred with a need for sufficient and maintained training. These and other aspects demonstrated the necessity for more than a mere contractor and coordinator, and the department thus developed into a director (½ director duties and ½ instructional design duties), another instructional designer, faculty coordinator, and faculty developer (contracted). All of these individuals live in different states, and to maintain the lean approach without the logistical burden of departmental management, it was

clear that transparency was required. This fast growth is the weakest link from going to a lean start-up to a fat hierarchy. However, it is my pleasure to report that we consider each other colleagues on a single team to serve online needs with a consistent understanding of the tasks each person needs to complete. Specific strategies are discussed in the next section.

B. Tweaking Tools

While the flow provided by Kanban is something that provides advantage to any process, implementing it in a command and control environment poses challenges due to superiors requiring proof of effectiveness before implementation. Additionally, the concept of flow that can be visualized in a variety of ways can be difficult to grasp for more traditional minds.

Many times the implementation of Kanban starts with small teams and blossoms into broader uses. However, in the situation of the university, small teams are so same-task oriented that the visual flow is not that helpful. The biggest impact is in the director level projects and tasks that encompass multiple departments. Directors are spread across different buildings and even across states, so the use of an online visualization is essential, such as LeanKit Kanban (<http://www.leankitkanban.com>), the software being used to implement Kanban for Ohio Christian University.

As the director of online education, my team is spread broadly across the United States (Oregon, Tennessee, Ohio, and Arizona). As a result, we do not use Kanban for a specific flow, but instead have it provide a picture to the entire team for real time status for strategic development, curriculum design, and faculty management levels for the online learning environment.

In the three visual control boards we maintain, it's easy to be horrified because it does not represent the Kanban flow in the sense of the trigger effect impacting other team members. It simply represents that real time picture and flexibility to adjust for the entire team that has no face to face contact, essentially creating three Personal Kanbans that are shared among the team. Conferencing and phone status reports have been cut down, as well as the need for several electronic reports. All the data needed for the one online report is provided within the cards and is very easy to retrieve. The color coding immediately informs us if it's an emergency, an improvement that is "nice to have", a curriculum task, or a non-curriculum task. Work in Progress (WIP) is not used for this circumstance simply due to the fact that multiple people use each board. For example, the curriculum design representation has a large amount of items being worked on, but we have to remember the context of two instructional designers guiding work on these pieces of curriculum for multiple weeks.

However, for the designers, there is a great way to make each piece of curriculum flow through the process easily. Reviewers who need to know the status of a course but do not touch the design aspect especially love this, as they receive a real time picture of the progress without, again, wasting hours on reports, and minimizing status reports on phone conferencing. With each color representing a level of status, it quickly turns into its own status report as well as personal organization for the user.

The other major tool we tweaked for our needs was Scrum. The requirement to change some aspects of implementing this tool is mostly due to the natural differences between software and curriculum development. Role fulfillment involved my being the product owner as the director, where it was my responsibility to establish and maintain curriculum priorities for all the programs. Also, part of my role included ensuring that student learning is effective and program accreditation is fulfilled, which are two very different stakeholders. The relationships are very different after that. When aligning the Scrum framework to instructional design, the team changes with each course. As product owner, it is my responsibility to see the holistic needs for all of the courses and how those fit within the bigger picture. However, each time I serve as an instructional designer in a writing relationship with a SME, or our other instructional designer enters into the same kind of relationship, the designer becomes the ScrumMaster that facilitates the development process, resolves impediments, protects/supports the writer, and adjusts forecasts as needed based on that specific project. The unusual aspect for the development team in this setting is that it really doesn't exist. Each writer, or SME, is also our external supplier and only has the relationship with the designer, who will often fulfill roles of both the development team and ScrumMaster.

Planning meetings are very important to the stages of the agile development process and occur between stage iterations, as updates and retrospectives are essential to the educational world as well, or in any world, for that matter. However, daily scrum meetings would merely add complexity and become waste in this particular relationship. Retrospective meetings are generally only between me as director and our other instructional designer as we discover insights with each writing process. Our Scrum artifacts are reviewed visible with our kanban board review with constant re-prioritization. Two components of Scrum that are absolutely essential to our adaptation are iteration review and acceptance criteria, both of which are discussed heavily in this section.

C. Language Inhibitors

It is human nature to develop new ideas and subsequently normalize those ideas into standards, expectations, and even requirements. There is, however, a dangerous balancing act between having enough standardization to make

conversation understandable and having so much that mindsets become boxed. My own exposure to agile encouraged me to not focus on adopting the perfect solution, rather on finding concepts that allowed us to remain lean and increase productivity. This is not the responsibility of the culture, but a need for the individual to maintain a mindset to constantly construct new knowledge based on prior experiences. If individuals achieve an attitude of lifelong learning and application instead of a sense of arrival, the culture will subsequently reflect that mindset. As such, I encourage *individuals* to understand the *intent* of terminology and raise personal *awareness* on how that terminology maps to other concepts and industries.

The fact that I did not share terminology with my team allowed us to get a sense of cohesiveness first without the stress of asking “are we doing this right?” Instead the question was “does this work for us?” The strong focus on conceptual approaches allowed a better adaptation, with a subsequent understanding of the terminology and how it maps to our needs.

V. SO WHAT?

The real focus is to find out the actual changes that online development experienced due to the agile applications to processes. Culturally, there is transformation in trust and cohesiveness, but how much productivity difference is there? Here are some quantitative improvements that have occurred as a result of the agile adoption.

A. Writer Satisfaction

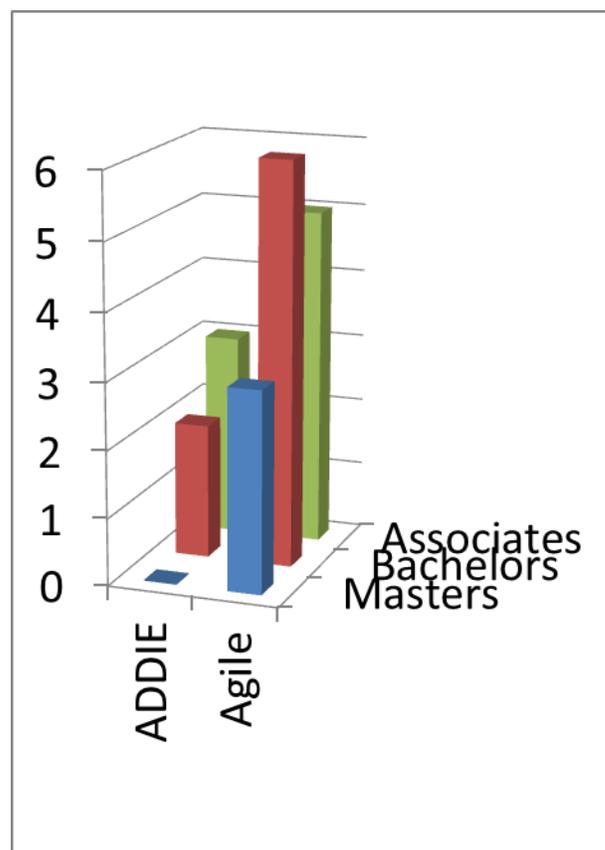
The increased satisfaction for writers has been extremely obvious with their new ability to focus on their expert content instead of fitting their content to logistics and expectations. The process developed is based on Scrum and the positive feedback has been tremendous, including one that stated he had not experienced any process so clear and concise. Also, it has allowed designers to provide better quality feedback to the writer as a result of the process reducing the time on logistics, also pleasing the writer. I remember when juggling the design of two or three 3-credit hour courses could be challenging, but now it is not difficult to balance ten of these courses and have a better relationship with all of the writers. Also, the number of questions from writers has dropped to almost zero, preventing 3-5 hours of failure demand per course due to the changed process.

B. Time Savings

There have been two levels of time savings for individual course development. First, the time invested across weeks has been slashed over 30% down to eight weeks for a start to finish product. Second, the time invested for total development hours has dropped 40% to 8-12 hours. This allowed us to introduce social media and other dimensions to the development without impacting the writers’ time and producing a far superior product.

C. Internal Communication

Kanban has had a huge impact on saved internal communication time. The dreaded monthly report of doom that cost several hours, communicating with each team member across several emails, and all-around stress has been reduced to a few clicks of a button, for less than five minutes to get results. Setting the kanban board up correctly allows full use of the analytics function for virtual management. Also, the team is always on the same page in real time for development purposes, doing away with the weekly or twice weekly phone calls. Now twice *monthly* phone calls are available for new initiatives and strategies. Finally, and certainly not least, another example of improved communication is the flow between clerical and design effort now requires no emails or phone calls.



This is the keystone slide that answers the “SO WHAT” question for why the agile approach has been so valuable to our process. When you realize that the massive growth of curriculum design within the *same* 40 hours a week dedicated to instructional design, the implications are astronomical! On top of this growth with the programs and subsequent individual courses, we have doubled our post-secondary education option courses that are developed more towards the teen experiences, and have had the time to start implementing social learning elements.

VI. CULTURAL IMPLICATIONS

Any organization that embraces the agile philosophy will experience a cultural transformation within the area that it is being adopted. However, the question to ask is how does one infiltrate the successes to other departments? Social learning and media is often noted as a strategy that cannot be forced, but must be accepted and adopted. The self-efficacy required to successfully support agile approaches within an organization is high, and as such, forcing those adoptions can easily meet with failure. Even more complex is a department knowing that agile works, but only having peer influence into other areas and being unable to make stronger recommendations. However, the implications of service and product improvement, not just success, make the effort of sharing concepts with others worth it.

If an organization desires the need for lean approaches to be implemented, then it is most appropriate that an outside consultant is hired to help concept map the processes and discover wastes, *followed by* tool implementation that supports the system. However, in the situation where a single department embraces a new methodology, it is best to simply share successes and demonstrate the tool within its own context. This allows related areas to see exactly what was done and find their own areas of need and application, which is an opposite approach. The proactiveness required for both the sharing and the adoption naturally connects well with agile philosophy.

The business of online academics is becoming more competitive as students can more easily demand customer service or leave with surprising ease to transfer credits given the streamlining of most accelerated course sequences. The natural progression of this competition is that the truly excellent service oriented educators will become “A” list schools while others will quickly fall into the defaulted “B” list schools that attract students that simply need a piece of paper and are not prepared for a commitment to their lifelong learning. Educators who wish to invest in the social change that this digital age is experiencing must adopt the business mindset along with the management methods that keep businesses on the cutting edge.

VII. GIVING BACK

As I have discovered the application of agile in the academic community, here are a few observations on how our modifications to the process can provide insight for the agile community.

- Transparency – the personal effects of transparency is that good employees get better. By allowing the tools to be open to other departments, the focus is properly on the individuals and interactions.

- Tools – improvement can be driven by tools if used wisely.
- Tool implementation – mapping the process, discovering the waste, and then selecting tool implementation is very effective for an organization cohesively selecting lean approaches. However, using a tool to demonstrate the effectiveness of a methodology such as what this article discusses also works. The important insight is to know which one is needed and why. What is *not* desired under any circumstances is to use a tool to drive process instead of the needs of the team to drive the process.
- Abstract coordination – management level needs to have the ability to coordinate across departments without micromanaging the details. Abstract visibility allows initiative without knowledge of details.
- Adoption resistance – people fear change and as a result do not embrace it. The model represented here allows writers to self-select out of the process. The barrier to existing processes is very low and fluid.
- Risk management – a major aspect of agile is risk management. The ability to offer a course at any stage reduces risk.
- Ad hoc – while our model relies on ad hoc teams for managing the writers, it also demonstrates that we should not be fearful of utilizing ad hoc principles.
- Value – rules are secondary to value.
- Adaptability – by adjusting the Scrum process, such as dropping the daily Scrum meetings, the process remained simple without literally adding what would have been waste for us, but an important element for other organizations.
- Variability – the human desire for predictability is not usually possible in knowledge work. The classes of service allow management of that variability to be more effective if the variables are included in those classes.
- Motivation – relating short-term and long-term goals is important for motivating team members. Teams or departments can feel isolated, but if there is a clear understanding of the holistic fit their work has, coordination, focus, and improved motivation occurs.

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