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Applying Lean Methodologies to the Development of an Entrepreneurial Venture in Education

Doctor of Education Leadership (Ed.L.D.)
Capstone

Submitted by

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in partial fulfillment of the graduation requirements for the degree of
Doctor of Education Leadership

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To my wife, Holly, for the endless support you have provided to my present, and my children, Elliot and Louise, for the hope and urgency you bring to my vision of the future.
Introduction

Before I began my time at the Harvard Graduate School of Education, I coached and supported the professional development of first- and second- year teachers in the Massachusetts corps of Teach For America. In the course of that work, I would suggest things for teachers to change and sometimes come back to find that they made no changes at all. When I would ask about this, I would frequently get answers like, “Great suggestion, Doannie, but it didn’t really fit my style.”

Reflecting on those moments during graduate school, I realized that I lacked language for acknowledging differences in how my corps members and I thought about teaching. I realized that my own suggestions came from my own perspectives about “good” instruction. I developed a hypothesis that when my suggestions were not congruent with the perspectives of my teachers, then the teachers were less likely to implement them.

In the first year of the Ed.L.D. program, I thought more about the problem of “fit” between the supports that teachers receive and their internally held beliefs about what constitutes effective teaching. From teachers’ interactions with coaches, curriculum, mentors and even whole schools, I began to believe that the match between the “style” of the support and the teacher was a strong determinant of how well that support would be internalized by the teacher.

Daniel Pratt’s work on teaching perspectives provided one model for thinking about differences between teachers and prompted me to reach out to him (Pratt, 1998). We developed a relationship that has continued to heavily influence my thinking about the differences between teachers. Additional research revealed other
places where a lack of recognition of teaching styles might undermine teacher improvement. Regarding both pre-service and in-service training, Feiman-Nemser writes about the need to recognize that teachers “come with images and beliefs that must be extended or transformed” and that this incoherence between teacher beliefs and their training inhibits the entire teacher development pipeline (2001). Indeed, fewer than half of teachers are satisfied with the supports meant to fuel improvement (Darling-Hammond, Wei, Andree, Richardson, & Orphanos, 2009).

Prior to the residency, I set out to fix the low quality of teacher professional development by differentiating it based on teaching style. I spent several months developing the taxonomy of teaching styles shown in Appendix A. This taxonomy, which I called the Teaching Genome, used source materials and interviews of practitioners in four teaching styles to describe how each thought about things like assessment, classroom management, the purpose of education and their theory about how students best learn. I used this taxonomy to develop the Teaching Genome Assessment, shown in Appendix B, which can discern a given teacher’s preferred style.

In my first conception of how to apply the Teaching Genome, I focused on using the Genome to organize resource banks by tagging things like lesson plans and assessments by style. I developed the following theory of action for this application:

1. If we can partner with a resource repository like TFANet or BetterLesson
2. If we can effectively tag their resources by style
3. If we give teachers the assessment and give them insight into their style preferences and access to the differentiated resources
1. Then teachers will spend less time finding or adapting resources.
2. Then teachers will have more time to practice with the resources.
3. Then teachers will be more effective at implementing the resources.
4. Then teacher practice will improve.
5. Then students will learn more.

However, this capstone is not the story of codifying a body of knowledge so that teachers can differentiate their professional development. This is the story of how I went from plan A to a business model that actually works. Through the residency process, I hoped to develop an enterprise that generated enough revenue to sustain itself while also positively impacting teacher performance.

Review of Knowledge for Action

My RKA will situate itself within the theory of action for the process of business development rather than for the product itself. Empirical studies about business plans created early in an organization’s life cycle suggest that few enterprises adhere to those plans in the long- or even medium-term (Delmar & Shane, 2003). My personal experience over the course of the past year suggests that even the most rigorous theories about what will create the largest impact for users often must be frequently revised when faced with real people in real situations. Compiling a body of knowledge for a theory of action for a particular version of a product puts the RKA at risk of rapid obsolescence as the product undergoes inevitable adaptations during the iterative process of product development.
I will instead use the RKA to articulate a theory of action for developing a business model that achieves both sustainability and impact, a priority for every new enterprise. In this context, I define sustainability as balancing revenue and costs or acquiring funding for ongoing operations that ultimately lead to that balance. I define impact in the short-term as the ability to draw a direct line, substantiated by qualitative or quantitative data, between the work of the Teaching Genome and improvements in teaching and learning. Focusing on how the Teaching Genome balances sustainability and impact will allow me to establish a theoretical and analytical frame for generating testable hypotheses, designing tests for those hypotheses, interpreting the results and generating meaningful changes to the business model based on that evidence.

In this RKA, I will present several frameworks for business development, establish an analytical frame for determining sustainability and impact and present a theory of action to guide the work of the Teaching Genome. In particular, I compare Lean methodologies with more traditional “waterfall” methods of product design and also compare several different models that implement the Lean method in different ways in order to ensure a match between the product and market. I also establish the relevance of two particular metrics, lifetime value and customer acquisition cost, for the success of early startups. In preparation for analyzing the results of our early market tests, I lay out a theoretical framework that helps explain which innovations spread and diffuse and which do not.

Product Development Methodologies
Lean Startup methodologies emphasize the importance of product-market fit. Companies create products for sale that serve some sort of purpose and do so by offering a specific set of features. The product must also align to what the market actually needs and will buy. Entrepreneurs commonly begin with this idea of a "pain point", a difficulty or challenge faced by the customer trying to accomplish a given task, and seek to create products that address those pain points. Traditionally, these pain points have been discovered through market research, usually employing tools like focus groups and surveys of potential buyers. While the value of that kind of research is not disputed here or by proponents of Lean methods, Lean contributes several ideas to this idea of matching product to market need.

Lean Startup is an example of a "hypothesis-driven development" process (Eisenmann, Ries, & Dillard, 2013) that seeks to optimize "product-market fit", the match between what the product offers and what users will buy. The process typically follows a cyclical progression that begins with the market research process undertaken by many traditional businesses. Market research generates a series of hypotheses about what potential users want in a product. For example, interviews of potential buyers and users might suggest that if the product has x and y features, they would pay some z price for that product. Or if the product has a and b features, it will be sufficiently different from competitor c to fill a market niche. These are hypothesized relationships between company design activities and market behavior.

Traditional methods such as "waterfall" techniques would consider the learning generated by the market research process as conclusions validated by the market research data. A company using market research in a traditional way would
use these conclusions to begin the process of developing an aligned final product that would then go to market for sale, which might take many months. Sales data would then come back to inform the next iteration of the product, which would again take many more months. Each time a company interacts with a user by gathering feedback about a product and uses that knowledge to improve the product represents a “learning event” (Fowler & Highsmith, 2001). In the waterfall process, there are two signature learning events. One occurs with the market research process, and the second occurs when the product goes to market, many months later and after the expensive creation of a polished product.

The long cycle between learning events makes waterfall methods inappropriate for the Teaching Genome’s product development process. While the Teaching Genome addresses a particular pain point around differentiating for different teaching styles, I faced significant ambiguity around the ideal target customer and exact intervention to address this pain point in the market. Given that level of ambiguity, spacing out learning events and making them contingent upon resource-intensive product launches would slow down the learning required to reach product-market fit.

Lean treats the learning from market research as hypotheses that must be validated by actual user and market data. The method also emphasizes the shortening of the time between learning events so that the company can test these hypotheses as quickly and cheaply as possible. A company using Lean methods would write out a series of hypotheses, identify the most fundamental and riskiest hypotheses and generate a "minimally-viable product" (MVP) that can be put on the market and
subjected to use by actual purchasing customers. Rather than waiting for the "final" product to have a useful learning event, the MVP provides data as fast as it can be generated and deployed, shortening the cycle time and providing more data that can be used to inform the next iteration of the product. Based on data that invalidates a hypothesis from testing an MVP, the team can choose to either pivot (change direction), persevere (continue on), or perish (shut down the operation) (Ries, 2011). According to Lean proponents, this process generates data that measures the actual product-market fit, rather than the theoretical fit hypothesized by market research.

The Effect of Business Model on MVP

The particular business model selected by an organization influences the type of MVP it creates. Software companies generate software product MVP's that are sold and deployed to users during a development process. A company that produces tangible hardware might create useable prototypes that can be sold and employed by early adopter customers. A consulting business might generate a consultation model that it tests and tweaks with successive clients.

One model that has become popular in the education technology arena is the "Software-as-a-Service" (SaaS) model, whereby access to applications is delivered through the web, eliminating the need for the user to install or maintain hardware or software (“Understanding SaaS: Why the Pundits Have It Wrong | Andreessen Horowitz,” n.d.). Web-based gradebooks in education are an example of a SaaS business. Since organizations should strive to generate MVP's at the lowest cost possible, entrepreneurs who aim to create SaaS businesses can sometimes use the
"concierge MVP" technique to test early-stage ideas. In a concierge MVP, the services that will be provided by a technology-enabled platform are delivered by a human approximating the functionality of the product to be built (“The Concierge Minimum Viable Product Maximizes Customer Learning | MVP Builders,” n.d.). This allows the development team to test critical hypotheses without building an entire costly technology product. There are clear pitfalls to over-generalizing based on results from a concierge MVP, such as assuming that there will be similar uptake rates when the person-to-person interaction is taken away. However, the concierge MVP model has utility if used as a proof-of-concept, since if it doesn't work when shepherded along by a savvy human, it is unlikely to be viable if done by an automated platform. A concierge MVP sets up further tests after demonstrating that the model works under a set of idealized conditions (“The Concierge Minimum Viable Product Maximizes Customer Learning | MVP Builders,” n.d.).

Examining Multiple Lean Frameworks

Lean Startup model suggests a process framework for determining product-market fit, and other entrepreneurs have elaborated on this idea to describe the particular aspects of both the product and the market on which the company must iterate in pursuit of fit. The principles of Lean emphasized visualizing the entire "value stream," what original Lean proponents Tom and Mary Poppendieck called the "concept to cash" pipeline (Poppendieck & Poppendieck, 2007). The hypotheses generated in the Lean process relate not just to product design, but to each element in the value stream, such as customer development, cash flow, go-to-market strategies
and so on. When hypotheses associated with the entire value stream have been validated, then the startup has achieved product-market fit (Eisenmann et al., 2013).

Ries and Eisenmann, in their HBS note describing Lean Startup, support broadening the use of the Lean method to incorporate aspects of the business model (2013). They introduce a table of questions that address more aspects of business development above and beyond just product, with questions that suggest hypotheses that can then be fed into the Lean Startup method. This framework is presented in Figure 1.

**Figure 1: Four categories of questions to address in business modeling**

Many of these questions are salient for enterprises of any size, however, given that the Teaching Genome is at a very early stage with limited capacity, I needed to
consider which questions to prioritize. The thinking of two additional entrepreneurs informed which aspects of the business model I needed to focus on for the scope of the capstone. In his elaboration of the "Lean Canvas" model, Ash Maurya, like Eisenmann et al, took a holistic approach in considering additional factors beyond just product features (Maurya, 2010). In addition to putting the product's unique value proposition at the center of the plan, the Lean Canvas model provides a framework for describing important tandem relationships. In a concise framework, it forces the entrepreneur to consider the connection between the problem and the customer segment, the relationship between the problem and features of the solution product, and the interaction between the company's cost structure and the revenue model that it will use to recoup those costs. Additionally, it also forces entrepreneurs to consider the channels by which the product will be delivered to customers and the metrics that will be used to judge the product's success. A blank Lean Canvas is presented in Figure 2 below.
Figure 2: The Lean Canvas model for creating a one-page business plan.

Metrics for Product-Market Fit and Impact

The Lean Canvas model succinctly lays out the interlocking relationships between aspects of product and market. However, according to David Skok, a veteran entrepreneur turned venture capitalist who writes extensively about startups, it overlooks two metrics associated with many startup failures: customer acquisition costs (CAC) and customer lifetime value (LTV) and the important relationship between these two indicators (Skok, n.d.-b). Customer acquisition costs capture the amount of time and resources associated with bringing on a paying customer, while lifetime value describes the amount of revenue a company can expect from the average customer based on how long they continue to pay for services or goods. Figure 3 below summarizes the distinction between CAC and LTV.
Many factors influence the cost of customer acquisition, and Skok's writings on the relationship between CAC and LTV for SaaS businesses provide useful guidance on optimizing the relationship between these metrics. The largest contributor to CAC is the nature of the marketing and sales operation. Whether a company uses direct sales versus web-based marketing techniques will heavily influence cost, with direct sales driving costs up substantially. Conversations with two local SaaS businesses in the education technology space, Panorama Education and Ellevation, suggest that direct sales operations are common in educational sales to districts and schools. This is consistent with the findings of a 2013 Pacific Crest survey of SaaS companies (Skok, n.d.-a). The simplest calculation for CAC involves
taking the total cost of all customer cultivation activities and dividing it by the number of customers acquired. I will calculate LTV using the method developed by Skok and Gill for SaaS businesses, which accounts for the average contract value (ACV), gross margin, and churn rate, the rate at which customers turn over on a monthly or annual basis (Skok, n.d.-b).

Both Skok and researchers at the venture capital firm Andreessen Horowitz have asserted that successful SaaS businesses achieve a ratio of LTV to CAC on the order of 3:1 (“Understanding SaaS: Why the Pundits Have It Wrong | Andreessen Horowitz,” n.d.). This ratio reflects the need for startups to cover the costs of acquiring new customers and maintaining a gross margin large enough to continue to provide for ongoing research and development over and above overhead costs.

Lean has provided a process for examining hypotheses related to the development of the business model. Skok and Maurya have suggested that the identification of market segments and their pain points, and closely monitoring the cost of acquiring these customers and establishing a sustainable price are the key activities for early stage businesses. However, these metrics are closely related to the question of impact. For CAC, the understanding of the impact of the service influences the appeal of the message, increasing the effectiveness of marketing and thereby decreasing the cost of customer acquisition. A strong case for impact also allows a company to increase price and reduce churn, resulting in an increase in the LTV for the average customer.

The limitation in the time horizon for the execution of the pilots this fall impacts my ability to gather data on student level change. I will draw upon the idea of
a sales conversion funnel or pipeline to connect initial usage of Teaching Genome tools to later effects on student achievement. Conversion pipelines are similar to logic models or theories of action in that each is a way of identifying a series of cause and effect relationships that lead to an intended outcome (“Paving the Path to Sales: The Conversion Funnel Explored | The Daily Egg,” n.d.). Figure 4 shows an example of a conversion funnel that links tool usage to impact.

![Conversion Funnel Diagram](image)

**Figure 4: Example conversion funnel linking use of the Teaching Genome tools to student level impacts developed for Teach For America**

A conversion funnel makes several assumptions. First, it suggests that in order to get the impact at the bottom of the funnel, the product must engage the initial steps at the top of the funnel. This assumption may not hold, since there might be product effects that the funnel may not account for. However, for product design purposes, the conversion funnel is a useful model since it prompts interesting reflection and revision on whether there were downstream effects without “top of the funnel” inputs. Second, it also assumes a rate of attrition at each phase of the funnel. This is also a useful framework for product design since if the testing does find connections between “top” and “bottom” of the funnel, then the product design process can focus
on optimizing each layer of the funnel until an acceptable attrition rate is established. Using this logic, we will be able to focus on the uptake and usage statistics for the product as initial proxies for student level impact.

While extremely popular in the current startup environment, the Lean methodology is not without potential pitfalls. Because companies in the early-stage like the Teaching Genome have a small number of initial pilots with relatively small numbers of participants, I run the risk of making decisions off of relatively thin data. Multiple confounders may also muddy results as pilots necessarily will occur in a variety of districts and schools where the context may influence the outcomes more than the product itself. In order to mitigate these pitfalls, I will supplement the data related to LTV and CAC with qualitative data gathered during pilots and in sales meetings. Where possible, I will also try to gather information about context in order to inform my analysis of results.

Theory of Action

Through the course of this capstone, I describe my pivots and assess whether they resulted in greater product-market fit and represented progress toward sustainability and impact. Based on the review of what it takes to launch a successful startup, I suggest the following theory of action:

- If I articulate the hypotheses that must hold true in order for the Teaching Genome to be both sustainable and impactful,
- if I set up tests that monitor uptake as a proxy for impact, and customer cultivation time and revenue,
• if I collect qualitative data on customer needs and wants, and

• if I review that data rigorously to inform my decision to pivot, persist or perish with certain elements of the business model and product,

• Then I will be able to identify a specific market segment and a pain point felt by that segment,

• I will be able to optimize customer acquisition costs and lifetime value, and

• I will be able to achieve product-market fit.

Since I have established that the strategic project for my capstone relates directly to the business model development process for the Teaching Genome, I also describe below the list of hypotheses related to initial model for the Teaching Genome that I subjected to the Lean methodology in fall 2014.

Analytical Frameworks for Innovations

In this section of the Review of Knowledge for Action, I will shift focus away from the startup as the unit of analysis, considering instead the nature of innovations themselves, and what characteristics contribute to the adoption of new ideas.

Everett Rogers, in his seminal work "Diffusion of Innovations", proposed five "perceived attributes" of innovations that influence their rate of adoption (Rogers, 2003). These five attributes are characteristics of innovations that individual decision makers perceive, which then have bearing on their decision-making process.
1. Relative Advantage: The extent to which a given idea is understood as more "beneficial" than the previous idea. Beneficial might be defined in several ways, and Rogers is clear about the fact that the new innovation does not necessarily need to provide "objective" benefit. The benefit may be in the form of changes in economic outcomes, social standing, or "satisfaction". Whatever mode the additional benefit might take, an innovation with a larger perceived relative advantage will be adopted faster.

2. Compatibility: The extent to which an innovation is understood as aligned to the "existing values, past experiences, and needs of potential adopters". Innovations that are consistent with the existing value system will be adopted more quickly. Compatibility spans the boundary between the individual and the social system of which the individual is a part, since values and norms are socially constructed.

3. Complexity: The extent to which potential users see the innovation as easy or difficult to implement. In this framework, simpler innovations are adopted more readily than more complex ones. The perceived complexity may be related to the underlying conceptual understandings or to the difficulty of new skills required to implement the innovation. For example, an innovation in education around new instructional techniques rooted in developmental theory would ostensibly require understanding of a complex conceptual framework, which might slow its adoption. A new gradebook program would require little difficult conceptual understanding, but may require difficult-to-master technical skills that would inhibit its widespread use.
4. Trialability: The extent to which a potential user can "try on" the innovation and explore some of its functionality. Rogers suggests that individuals faced with new innovations primarily attempt to reduce uncertainty about the new idea. In Roger's framework, if an innovation is "divisible" into parts that allow the user to develop experience with the idea, then users will adopt it more readily, if the trial provides positive feedback about factors like relative advantage and compatibility.

5. Observability: The extent to which external parties can see the outcomes of implementing an innovation. The characteristic of observability acts through social systems. The characteristic of observability prompts peers to engage the individual decision-maker interacting with peers. In these interactions, the adopter crystallizes his or her own evaluation of the innovation. If that evaluation is positive, these peer-to-peer interactions speed adoption.

In addition to these five characteristics of innovations, Rogers also discusses the idea of "re-invention", the extent to which an innovation can be "changed or modified by a user in the process of adoption and implementation." Potential adopters of inflexible innovations may struggle to make the innovation work in a context different from the one for which the innovation was designed. Rogers suggests that users adopt innovations capable of re-invention more quickly than their static counterparts.
The rate of adoption of depends not only on the characteristics of the innovation, but also whether they are adopted by individuals or organizations and, in the latter case, the organizations’ attributes.

Rogers's research suggests that a mix of individual characteristics of a leader and the internal characteristics of the organization contribute to the entity's orientation towards innovation. Some of these characteristics contribute positively to what Rogers calls "organizational innovativeness", while others detract from it.

Centralization refers to how coordinated and concentrated authority is within a relatively small number of actors. Highly centralized organizations are associated with less rapid adoption of innovations, which Rogers attributes to the restricted range of ideas that are considered by the organization when decision-making is concentrated among a few key players. These high-level leaders also have less exposure to the "pain points" experienced by those at the operational level, and are therefore less aware of opportunities for innovations to ameliorate these problems.

Complexity is the extent to which the members of the organization have both a breadth and depth of expertise and knowledge. Diverse, highly trained and educated workforces may be better positioned to understand the opportunities represented by a potential innovation and may be better equipped to handle the challenge of implementation. These factors suggest that increasing complexity within an organization are associated with increased organizational innovativeness.

Formalization describes the level of codification of internal processes within the organization. Entities whose activities are highly structured and inflexible adopt innovations at a slower rate.
Interconnectedness is the extent to which members of different functional areas communicate with members of other teams. In a highly interconnected organization, shared knowledge and ideas spurs innovation.

Organizational slack describes the amount of unallocated resources within the organization that could potentially be applied to innovations. While larger amounts of slack are associated with greater organizational innovativeness, this factor is particularly important when the innovation is resource-intensive.

These two aspects of Rogers’s model provide an analytical frame that encompasses the Teaching Genome as the innovation and the potential users who either heard my pitch or decided to purchase our services. In other words, these two frameworks describe important characteristics of the product and the market. If Lifetime Value (LTV) and Customer Acquisition Costs (CAC) help provide measurable clarity to the idea of product-market fit, then these two bookends from Rogers may help explain why LTV and CAC change as the Teaching Genome has endeavored to achieve that fit.

The Strategic Project

I originally conceived of the Teaching Genome as a taxonomy for describing different teaching styles. As I built the taxonomy, I began to see how such a tool might be used to better personalize teacher support through channels such as the coaching relationship, through the delivery of the professional development modules, or by introducing more detail and nuance in the teacher evaluation process.

In pursuit of this vision for systems change, in the fall of 2013 I worked with
my Ed.L.D. colleague Alex Seeskin to build the taxonomy, under the supervision of Dr. Richard Elmore. We also began to lay the foundation for an assessment that could differentiate the preferences of a given practitioner. As we did this work, we both were engaged in the residency matching process. During this process, NewSchools Venture Fund expressed interest in supporting me as an Entrepreneur-in-Residence for the 2014-2015 academic year to develop the Teaching Genome into a viable enterprise. That support began on June 16, 2014, and from that point, I organized my work as a startup founder seeking to create a minimally viable product capable of going to market.

To this end, I developed a strategic project plan that would pursue multiple work streams related to business development. As the founder of the Teaching Genome, I would work on developing a product, cultivating pilot sites to test the product, build a customer acquisition strategy, consider how to organize as a business entity, recruit talent, and experiment with pricing.

Over July and August, I focused on researching the market segments I hoped to reach, developing and validating the Teaching Genome Assessment and report, and cultivating pilot sites for the fall. In September, I began to build a team to help me refine the assessment and develop tools that would provide additional value to users. From October through December, I executed the pilots, captured the data from the hypothesis testing, and began to cultivate additional pilots for the spring. To organize this work, I used the Lean Startup framework to define and test the hypotheses related to the business model, focusing on achieving product-market fit by optimizing customer acquisition costs and lifetime value.
In this part of the capstone, I describe the output of my market research and the hypotheses I generated as a result of that research. I then describe the main hypothesis testing activities. For each activity, I describe the hypothesis, the participants, the metrics used to validate the hypothesis, and give a brief narrative of the outcome. In the Results section, I review the outcomes of the fall pilots in order to determine whether the Teaching Genome has evolved in such a way to better maximize product-market fit.

Outcomes of Market Research:

Before engaging in the process of hypothesis generation, I engaged in market research to determine the pain points for a host of potential users. I interviewed school leaders, district and charter system leaders, teachers, and coaches.

The prevalence of one-size-fits-all professional development and coaching originally motivated my creation of the Teaching Genome. As a coach and planner of professional development in my previous work with Teach For America, I continually ran into problems related to differences in perspectives about the nature of teaching and education. Frequently, I wasn’t able to clearly articulate the differences in style and approach that existed between me and my teachers. In the best cases, we were able to have rich conversations about teaching and learning that led to a deeper understanding of each other’s perspectives. Sometimes, though, this inability to communicate clearly about style led to antagonistic relationships that undermined trust and our ability to work together productively.

I created the Teaching Genome to differentiate professional development
based on the pedagogical style of individual teachers. Initial market research with a few system level leaders in the Boston area suggested that there might be a market for such differentiated professional development, but these signals came from largely suburban and affluent districts. Two other large system level leaders expressed concern that further individualization and atomization of professional development was unlikely to create change at scale.

Considering other pain points, I began to look into how the Teaching Genome might be used to improve coaching and evaluation, since this was both a challenge for many districts and they had committed resources towards evaluation roll-out that might represent a solid revenue stream. Further interviews with both teachers and administrators indicated that the success of this business model depended upon the skill and interest of administrators in being instructional leaders, an assumption that might not hold true at scale.

Another part of my market research involved estimating prices for the services we would offer. I did a market landscape analysis of professional development companies, small-scale boutique educational consulting organizations and companies that offered hybrid services that bridged selling products with in-person trainings. Many of the services that were based on project work that could be analyzed from an hourly rate suggested fees in the $100-200 per hour range. I then tried to estimate the cost-to-service for various products and then considered various levels of discounts I would need to offer in order to account for the pilot status of the work. Later estimates for cost used the initial cost-to-service calculations in order to set a price that got closer to satisfying the CAC = 3 x LTV rule for sustainable SaaS businesses.
Establishing a Baseline Sales Conversion Rate

In order to have pilots for testing the Teaching Genome and also to set a baseline for the effectiveness of pitches of the Teaching Genome’s value proposition, I pitched the Teaching Genome as a coaching tool to eighteen prospective clients. These potential customers were mostly school and district leaders, with some non-profits as well. I pitched services related to providing the assessment, knowledge about different teaching styles, and how to coach using the Teaching Genome. Of those eighteen, four converted into actual pilots, resulting in a sales conversion rate of 22.2%. The Teaching Genome derived a total revenue of $3400 from these pilots, for an average contract value of $850.

Testing the viability of providing Differentiated Professional Development

One early model for the Teaching Genome that I developed involved giving individual teachers resources that aligned to their style. In order to test the feasibility of this model, I decided to test the following hypotheses:

- We can find resources on the internet that align to styles in a cost-effective way.
- These resources will be enough for coaches to help teachers add new skills to their repertoire.

Participants:

- One intern, whose labor was valued at $40/hr
The two Managers of Teacher Leadership Development (MTLD’s) of the Louisiana Delta region of Teach For America.

Metrics:

- Cost to Launch the Teaching Genome Resource Bank (dollars)
- The number of times that the MTLD’s could find resources that they could use with their teachers (self-reported measure from weekly check-in calls with MTLD’s)

Narrative of Activities and Outcomes:

The Teaching Genome Resource Bank cost $1400 to launch, which involved finding publicly available resources like lesson and management plans aligned to each style and compiling them in an easily accessed Google Drive. MTLD’s were able to find the resources they wanted one third of the time.

I estimate that the cost of bringing on four experts in each style who could design resources that would build out the existing resource bank would be $22,000, and that ongoing development would require approximately $11,000 monthly, if those experts were kept on staff. If the Teaching Genome chose to employ a similar “Master Teacher” program as used by BetterLesson, we could possibly generate the resource bank for a cost of $48,000 yearly, which would include overhead costs of managing such a program. While this amount did not represent a huge resource expenditure relative to standard VC funding amounts, I would have been positioning the Teaching Genome to enter a crowded market of resource providers like BetterLesson, Teaching Channel, and ShareMyLesson. Additionally, I would have
needed to scale up hiring in order to fully validate demand for this product, so I decided that I would explore other options first.

Turning away from personalized PD was hard. I knew that I was going against the tide of the current fashionable ideas about personalized learning. EdSurge had no fewer than 10 articles about personalized teacher PD over the course of a month. However, I knew that there was no evidence that personalized learning for teachers results in measureable changes for students. I felt a deep commitment to the idea that learning is a social activity, for both teachers and students, and that we needed to do more to ensure adult learning in schools. Even though I knew that it was going to make my pitching harder, I knew that good research supported the impact that other interventions like coaching or collaboration could have in schools.

Testing a High-Touch Implementation of the Teaching Genome as a coaching model

In line with the concept of a concierge MVP, I needed to better understand the circumstances required to implement the Teaching Genome as a coaching tool. I created 7 coaching protocols that used the Teaching Genome Assessment results to spur a conversation about instructional improvement. Users had a choice about which protocol to employ with a given teacher, and each one could be used individually or in conjunction with other protocols. Figure 5 below shows the list of protocols and their respective purposes.
I also developed an “Introduction to Teaching Styles” workshop that trained participants on the characteristics of the four styles and also how to interpret their Teaching Genome Assessment results.

Over the course of three pilots, I reduced the extent of supports I provided to clients and made observations about their implementation of the tools. In the first of these pilots, I worked with the staff of the Louisiana Delta region of Teach For America over the course of six weeks beginning in October 16, 2014.

Hypotheses:

- Coaches can be trained to recognize different styles based on observations of teaching and examination of artifacts (lesson plans, assessments, etc.)
• Coaches will use TG coaching tools in their interactions with coachees

Participants:
• The three members of the Teacher Leadership Development team of TFA-Louisiana Delta. The two primary staff members responsible for coaching taught for two years and were in their first year on staff. They are responsible for coaching across grade levels and subjects.
• The 40 teachers overseen by these 3 staff members

Metrics:
• Percentage accuracy on a performance task on identifying styles in teaching samples
• As a result of weekly check ins:
  o Percentage of CM’s for whom the TG is influencing approach
  o Percentage of CM’s where MTLD is using TG coaching tools

Narrative of Activities and Outcomes:
I delivered a six-hour training on October 17, 2014 to three TFA staff members who directly support forty teachers. I delivered both the “Introduction to Teaching Styles” workshop and a training on the use of the coaching protocols. All participants were able to identify styles based on presented video of teachers and resources. The second half of the coaching session had more mixed results. Coaches were only able to execute well on 75% of the protocols, and understandably struggled with the most difficult of the coaching protocols, which required them to help a new corps member define a personal theory of learning using their Teaching Genome
Assessment results. I also provided access to the Teaching Genome Resource Bank and the style-aligned tools that it contained.

Because this was the high-touch pilot, I set up weekly check-in calls with each team member to gather details about their uptake of the tools, get feedback about their use to date, and to troubleshoot further utilization. I found that the MTLD’s used the coaching protocols explicitly with 50% of their teachers, however, they reported that Teaching Genome directly influenced the MTLD’s’ approach with more than 80% of their corps members. Further discussion with the MTLD’s showed that “influencing their approach” meant many things. First, they reported that their own Teaching Genome results helped them define their own lens. They also reported that getting their corps members’ results helped them consider what kinds of suggestions the corps member might be most receptive to. The MTLD’s reported that using the protocols helped the coach and coachee discuss their perspectives on teaching. They used these protocols more than they used those associated with synthesizing a more comprehensive vision for instruction to guide the coaching relationship.

Over the course of the fall, the total cost to service this client was $950, assuming that my own time was worth $50 per hour. This resulted in a gross margin of 32% based on a sale price of $1400 for the services provided.

Testing the Coaching Model with the Delivery of the “Introduction to Teaching Styles” workshop but without ongoing support

In work with my second client using the coaching model, I reduced the time to service the client by providing the “Introduction to Teaching Styles” workshop and briefly introducing the coaching protocols, but providing no ongoing support services.
Hypothesis: Coaches will use TG coaching tools in their interactions with coachees, if they are exposed to the training, have access to the tools, but are not supported in an ongoing way to use the tools.

Participants: The administrators and instructional coaches at Chelsea High School

Metrics: I deployed a survey that asked the 10 participants to select all of the ways in which the Teaching Genome had influenced their work:

- The Teaching Genome is influencing my thinking
- I discuss it with colleagues who also attended the training
- I have discussed it with colleagues who have not attended the training
- I have used one of the coaching protocols provided at the training.
- Other, please describe:

Narrative of Activities and Outcomes:

Based on the preceding TFA-LAD pilot, I had adjusted my expectations of the coaching/facilitation portion of the workshop, and framed it around how one would simply make a suggestion based on knowledge of one’s own instructional lens and the assessment of the instructional lens of the coachee. This allowed us to reduce the time expenditure by more than two-thirds and get the gross margin up from the 32% for TFA-LAD to 80%. Results from the Introduction to Styles workshop were similar to those from the TFA-Louisiana Pilot – high satisfaction and high ability to discern styles based on presented artifacts. This resulted in several markers of deeper engagement – stronger qualitative outcomes from the plus/delta feedback session at
the end and, from a demand perspective, a commitment to 4 more paid engagements from the school leader.

There were several notable quotes from the 11 participants:

- "This is going to change the way I coach my PLC's tomorrow."
- "I feel like I need to reflect even more deeply on my lens and what that means about the way I coach my people."
- "I got feedback when I was just starting teaching that totally dismissed what my goals were as a teacher, and I almost left education twice because of it. I never had the language and framework for understanding that, but I do now. I have to go think about this for like a thousand more hours."
- “I have definitely been thinking about our learning a lot and already changed the way I was talking to one of my teachers (in the arts department who DEFINITELY does not fall alongside me in Efficient Coaching!) It has helped me to understand how to change the way I was framing my feedback.”

In the follow up survey deployed two weeks after the initial workshop, I collected the following data:

- 75% report that it is influencing their thinking
- 100% have discussed it with colleagues who attended the training
- 72% reported discussing it with colleagues who did not attend the training or engaging with it in some other way, as described in the qualitative comments
- 0% used one of the coaching protocols
This data suggests that after reducing the time expenditure and getting the gross margin closer to 80%, we got very similar outcomes in terms of satisfaction and how the Teaching Genome was influencing approach, but saw the uptake of coaching tools go to zero.

Qualitative data (gathered through plus-delta notes included in Appendix C) from the administrative team at Chelsea High School suggested that it helped them with their coaching by influencing their approach with teachers and making them aware of their own instructional lenses. Follow-up sales meetings with the school leader also suggested demand for a different set of features. She said that the initial workshop and discussion highlighted how un-aligned they were about what constitutes "high-quality" instruction. They wanted the opportunity, and guiding structures, to more deeply discuss what they believed as a team. Based on our discussion, we generated the idea for a Shared Theory of Learning protocol to help them define their theory of learning as a team. They also wanted something to help them identify where on this theory they wanted to be "loose", allowing for diversity and innovation, and where they wanted to be "tight," or more consistent and aligned in their expectations and practice.

A follow-up sales meeting yielded an additional contract for services for the Spring aligned to the new stream of demands related to improving team collaboration around instruction. Over Spring 2015, I have helped the administrative team develop a shared theory of learning, a process that I suspect will take 2 hours of execution time with an additional 3 hours of preparation, 1 hour of follow-up and 1 hour of research and development time at a cost of $900 to Chelsea High School, for a gross
margin of 66%. I will also support the coach of a math professional learning community at the school, with the aim of building capacity to collaborate outside of the administrative team alone. I expect to spend about 10 hours supporting this leader with an additional 3 hours of research and development time at a cost of $1100 to Chelsea High School, for a gross margin of 36%.

These two sales to Chelsea High School represent an important variation on the core idea of helping groups of educators. I will focus more on administrators with one product and on teacher teams with another.

Testing the Uptake of Coaching Tools when paired only with the deployment of the assessment

APR is a high-performing, well-run charter school that has explicitly defined itself as an alternative to the “no-excuses” charter school model. With the Academy of the Pacific Rim, I sought to understand the impact of the Teaching Genome and the uptake of Teaching Genome tools after reducing the cost to service the customer even further relative to both TFA-Louisiana Delta and Chelsea High School. Additionally, I bundled another test of customer acquisition strategy, deploying the assessment for free in order to see if receiving school-wide results would spur further expenditures from the administrative team if they were exposed to the same product offerings as other potential clients.

Hypothesis:

- If teachers and administrators take the assessment and get access to the coaching tools, they will use the tools without additional support
Participants:

- 4 administrators and 15 teachers at the Academy of the Pacific Rim high school campus.

Metrics:

- Percentage uptake as measured by the pageviews of the protocols on the Teaching Genome website

Narrative of Activities and Outcomes:

On Nov 5, I deployed the survey, shared the coaching protocols online with the administrative team, and set up monitoring of the site traffic to get a sense of uptake behavior using Google Analytics.

I deployed the assessment for free to the staff and saw the following results:

- 10 unique pageviews of protocols on day of APR pilot, presumably from staff of 19.
- Most of the page exits occurred on the 2nd protocol on the list, out of 7, meaning they didn't go very far down the list in their perusal.
- Zero views after 11/6

This outcome suggested that reducing my time input into using the Teaching Genome as a coaching tool was associated with a significant drop-off in uptake of the tools. Since sustainability would require increasing gross margins by reducing the cost to provide the service to the customer, this test suggested that it might be difficult to attain that reduced cost with the coaching model.

Testing the Virality of the Teaching Genome Assessment
In addition to the product development tests I ran with both TFA-Louisiana Delta and Chelsea High School, I also ran a test of customer acquisition strategy with this group of fifty total teachers, administrators and coaches. I hoped to determine whether people would invite friends and colleagues to take the assessment after taking the assessment themselves at rates large enough to qualify as “viral.”

Conducting promotion in this way drives down customer acquisition costs significantly, generating new leads with minimal marketing costs.

Hypothesis:

- If practitioners get access to the assessment and the opportunity to invite others to take the assessment for free, they will invite enough others to get viral growth. In this model for scaling, scale is less about actual numbers and more about the rate of growth. Internet companies hoping to take advantage of “viral” growth and thereby lower customer acquisition costs use this formula to calculate their growth rate:

\[ k = i \cdot c^2 \]

where \( k \) is the k-factor, or growth rate of companies, \( i \) is the number of invites sent by each customer and \( c \) is the percent conversion of each invitation. Based on the experience of other internet entrepreneurs, a k-factor between 1.4 and 2.1 is considered “hot” viral growth (“The Four Viral App Objectives (a.k.a., “Social network application virality 101”) | FrameThink,” n.d.).

Participants: Forty total teachers from across the Louisiana Delta region of Teach For America, and the 10 coaches and administrators of Chelsea High School.

Narrative of Activities and Outcomes:
As an initial test, I created a landing page on the Teaching Genome website where people could enter up to five email addresses to which I would send invitations to the Teaching Genome Assessment. After the users completed their assessments, they were re-directed to this landing page. Eleven days after the launch of the assessment with 49 assessment takers, three completers submitted a total of seven email addresses.

Using the “Introduction to Teaching Styles” as a Customer Acquisition Strategy

After failing to generate much viral traffic from deploying invitations to the Teaching Genome Assessment, I decided to test whether partnerships with teacher leadership organizations like Leading Educators and Teach Plus might lower customer acquisition costs.

Hypothesis:

• If we are able to partner with organizations that train teacher leaders, we will be able to acquire customers more cheaply.

• Delivering the “Introduction to Teaching Styles” workshop is a valuable customer acquisition tool

Participants: Senior leaders at Leading Educators

Metrics:

• Conversion rate into a partnership agreement. Percentage of participants that convert to paying customers

Narrative of Activities and Outcomes:
I flew to Leading Educators to present the “Introduction to Teaching Styles” workshop to a group of both Leading Educators staff and some alumni of their teacher leadership fellowship. The session resulted in a verbal commitment to fold the Teaching Genome into trainings for all of their fellows across the country, and the conversation to finalize that relationship is still ongoing. They paid $1000 plus travel expenses for that workshop, resulting in a gross margin of 70%, similar to the initial work done with Chelsea High School.

**Pitch-testing the Teaching Genome as a means to improve teacher collaboration and adult learning**

After completing the fall pilots and listening to the interests and demands of some of our early adopters, I developed a use case and value proposition for the Teaching Genome where the assessment results would be used to change the way that teachers collaborate around instructional improvement. I began to use this revised value proposition to pitch to both new prospective clients and to expand services offered to existing customers.

Hypothesis:

- If we position Teaching Genome as a tool for generating a stronger shared instructional vision and for creating a framework for team collaboration, then we will increase sales efficiency and the average revenue for each sale.

Participants: 7 prospective and 2 existing clients

Metrics: Sales conversion rates and revenue per sale
Narrative of activities and outcomes:

Compared to the baseline sales conversion rate of 22.2% for the coaching model, the teacher collaboration model yielded 2 new bookings based on 7 cultivation meetings for a new client conversion percentage of 28.6%. Of the two existing clients who were exposed to the new value proposition pitch, one converted into an additional contract for expanded services. The size of the average sale based on the coaching model pitch was $1200, whereas the average sale for the revised teacher collaboration sales pitch was $2250.

While I experienced the earlier shift from personalized professional development to coaching as difficult, I embraced this second shift more readily. In my mind, personalized professional development resonated with my desire to empower teachers, while focusing on a coaching tool went one level away from teachers. Pivoting to teacher teams felt like returning to a model that empowered teachers again.

Table 1 below summarizes the outcomes from the four pilots. As measures of product-market fit, I calculated the gross margin and LTV based on revenue and cost-to-service estimates and describe the services offered and how our metrics were impacted by the intervention.

Table 1: Summary of pilots in terms of services offered, price, costs and lifetime value required to generate impact.

<table>
<thead>
<tr>
<th>Pilot</th>
<th>Services</th>
<th>Gross Margin</th>
<th>Measureable Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>TFA-Louisiana Delta</td>
<td>• Assessment • Introduction to Teaching Styles Workshop • Coaching Training and Support</td>
<td>39%</td>
<td>Genome “influencing approach” with 80% of CM’s 50% uptake of coaching tools with CM’s</td>
</tr>
<tr>
<td>Chelsea HS</td>
<td>• Assessment • Introduction to Teaching</td>
<td>70%</td>
<td>Genome “influencing” thinking and approach” with</td>
</tr>
</tbody>
</table>
In addition to the table above, I also calculated the LTV and CAC for both the coaching and teacher collaboration model and report the sales conversion percentage for each pitch.

- **Coaching Model:**
  - 22.2% sales conversion rate
  - Customer Acquisition Costs: $1755
  - Average Contract Value: $1200
  - LTV: $2200

- **Teacher Collaboration Model:**
  - 28.6% sales conversion rate
  - Customer Acquisition Costs: $1365
  - Average Contract Value: $2400
  - LTV: $4800

**Funder-Facing Pitches**

The data from the fall pilots and the cultivation of the spring pilots suggests that the Teaching Genome was increasing the extent of product-market fit as measured by increases in lifetime value and decreasing customer acquisition costs.
Client-facing pitches were going well, but funder-facing pitches were not. From fall 2014 to February 2015, I participated in three funder-facing competitions, none of which were successful.

From the first application to an incubator, I got the feedback that it wasn't clear that I was open to pivoting from my core idea. I inferred that they were looking for people who did not slavishly commit to an idea when the data supported other use cases. Ironically, I was pitching from the teacher collaboration model and NOT the coaching model, having already incorporated a round of data to inform that pivot.

From the second business model competition, I got the feedback that I did not paint a clear enough picture of demand and the problem. From the third pitch competition, I got similar feedback about the fact that the issue I raised and the problem I identified did not "click" as a huge issue.

Out of three external pitches, two of them did not resonate with the gravity of the issue I presented, and one focused more on my perceived "malleability" as an entrepreneur searching for product-market fit.

ANALYSIS:

Lean startup methodologies set the stage for the work I engaged in with the Teaching Genome over the course of the fall as I pursued product-market fit. I monitored uptake of our tools and qualitative customer perceptions as proxies for impact. Based on this data, I made pivots to our product and value proposition that resulted in a reduction in customer acquisition costs as our pitch efficiency went up.
and number of customer cultivation hours went down. The pivots also increased our Average Contract Value, which in turn increased our lifetime value per customer. I interpret these changes in CAC and LTV as indicators that the business model has achieved greater product-market fit.

In this section, I will use the Rogers's work on diffusion of innovations to offer an explanation for these changes in CAC and LTV. I will train one analytical lens on the characteristics of the innovation itself and another lens on the organizations that have purchased the innovation. By using these frameworks, I will describe patterns in the characteristics of education organizations' approach to adopting new technologies.

Rogers's characteristics of innovations framework describes the role of relative advantage, compatibility, complexity, trialability and observability in the rate of diffusion for a given innovation. In the section that follows, I provide my explanation of why the comparison went the way that it did. I conclude that the PLC model has sold more effectively because it better exemplifies the characteristics of rapidly diffusing innovations.

Relative Advantage

In terms of relative advantage, the PLC model more directly served a pain point in the market. As a qualitative data point, in response to my assertion that PLC's are an under-supported structure in schools, both of my sales contacts responded with a variation of "ugh, those are terrible." In contrast, both of my clients for the coaching model both expressed confidence in their coaches, and that this would be a "nice to
have" that would "support their practice." One hypothesis for this difference in perception of the pain point is that coaching is a relationship-based competency that leaders may "hire for". They may perceive it more as an intrinsic trait, and any tool to support it would therefore be an "add on" rather than the primary source of value. Compared to the status quo, the leader may perceive that the Teaching Genome adds relatively little.

When considering the Teaching Genome as a method for PLCs, a decision-maker may have a clearer sense of a negative counterfactual. They may know intimately that PLC's are generally unstructured, and may hold a belief that these are "vent sessions" that do little to advance student achievement. The relative advantage of the Teaching Genome would then be high, as it competes with very little.

Compatibility

In terms of compatibility with existing beliefs, norms and practices, the teacher collaboration model may again be more conducive to rapid diffusion than the coaching model. As I noted in considering the relative advantage of each model, the coaching model may have had to compete with an existing framework for coaching. In my pilot with TFA, it certainly had to contend with an existing process that mediated the relationship between the CM and the MTLD, teacher coach.

Many schools and districts have developed their own frameworks for evaluation or purchased models like the Danielson framework. Districts that have distinct coaching models also have adopted systems like the New Teacher Project or similar frameworks that apply a codified coaching methodology. Because of the
presence of a pre-existing model that both sets norms and patterns of behavior, and already provides relative advantage, pitching the Teaching Genome coaching model might have been an uphill battle.

The Teaching Genome was able to access a felt belief among teachers that I call the "anti-widget effect" in recognition of the influential report from The New Teacher Project that pushed against the idea that teachers are interchangeable widgets that achieve equal outcomes (Weisberg et al., 2009). I think that many teachers also feel that they differ widely in terms of their approaches to teaching. Even though the Teaching Genome coaching model applies this idea to an important interaction between a coach and a teacher, so does the teacher collaboration model, so it may not have a net advantage.

Both models play an interesting role in mediating the norm of autonomy that is prevalent in teaching (Kardos, Johnson, Peske, Kauffman, & Liu, 2001). The coaching model reifies that norm, treating the teacher as a professional with a particular approach and tailoring the coaching intervention to match it. The coach might choose to push the teacher to expand his or her toolkit to encompass other styles, but overall, it focuses on the teacher as an autonomous unit. On the other hand, the teacher collaboration model moves squarely in the direction of the collective. The collaboration model still acknowledges the professionalism and preferences of the individual, but it explicitly asks them to engage in a collective enterprise rather than the embrace the egg crate model of teaching (Hargreaves, 2010).

The coaching model engages administrators in the act of instructional improvement. This act may have violated the norm that supports teachers’ autonomy
from external control and management. However, since the purchaser and decision maker is a member of the administration, this effect may not have been a major influence in the decision-making process.

Complexity

Rogers also suggests that complexity of the intervention for the user is a factor that influences the rate of diffusion. This is a complicated characteristic to dissect. As I noted in the RKA, we applied the concierge MVP model to test some of our core assumptions related to product design. In this testing methodology, a human plays the role of the system that will eventually be automated, which allows the team to test core assumptions before investing resources in product development. Unfortunately, this may have a distorting effect with regards to who has to manage the complexity of the process.

The coaching model as implemented this fall put more work on the user. I provided six hours of training and a total of five hours of support for coaches in one pilot, but the bulk of implementation with teachers was left to them. The coaches bore the cognitive load, and the majority of the responsibility for handling complexity was on them.

In contrast, because I was using the concierge MVP method for testing the teacher collaboration model, I was responsible for executing the protocols. This model was consistent with testing the hypothesis that we could create protocols that would use the Teaching Genome to improve collaboration around instruction. However, it includes another assumption that will be critical to our ability to scale,
the assumption that teams of teachers will use the protocols faithfully without an external human facilitator. As of February 2015, we are testing this hypothesis as well, results pending.

From a complexity standpoint, however, using the concierge MVP approach shunts at least some of the complexity from the user/customer to the concierge. As a result, this may distort the felt complexity of the customer, resulting in faster diffusion and easier sales. This likely contributed to the larger Average Contract Values of the teacher collaboration model, but has important implications for how we continue to develop product features to maintain that higher value while removing the human facilitator.

The extent of an innovation's trialability determines how easy it is for a potential adopter to test out the innovation in a limited way. At first blush, the two models seem comparable in terms of trialability. A school could use the tools with a limited number of coaches or a limited number of collaborative groups.

However, I claim that the norm of equality makes the teacher collaboration model more easily trialed. In many districts, and certainly in our pilots for the coaching model, evaluation and coaching are closely tied. Because of both the power relationships and the implications of evaluation of teaching, I suspect that people feel more strongly about the consistency of the coaching/evaluation process. In looking at our sales more closely, I notice that the sales of the coaching model occurred at the whole-school or organization level, while both of my sales of the teacher collaboration model were for a single team at each site.
The norms of consistency and equality explain this result and give us important insight into trialability. When faced with a new coaching model and keeping equality in mind, administrators would need to make a larger purchase to provide the same opportunity to all teachers. However, since evaluation and assessment are not an issue in teacher collaboration, equality plays less of a role in the decision and the purchaser then may be freer to try the innovation in a more limited context shy of a whole school deployment.

Observability influences the rate of diffusion through the extent to which adoption by one entity can be noticed and noted by another. Rogers suggests that this operates through a mechanism of social signaling that leads to questions directed at the early adopter. The adopter then needs to synthesize their opinion, which if positive, may lead to the inquirer taking a chance on the innovation. While this has implications for the business model I will describe in the Implications for Site section, this characteristic of innovation may not provide much in the way of explanatory power for why LTV and CAC changed between the two models.

In considering the innovation itself, most of the characteristics that favor rapid diffusion tend to tip in the direction of the teacher collaboration model. Certainly based on qualitative feedback from users, this model seemed to offer greater relative advantage and could be tentatively tried out more easily.

In terms of compatibility with existing practices and norms, the picture is more mixed. Each model enhanced the sense of different approaches to teaching. However, each also pushed against the norm of autonomy differently, one by engaging the administrator and the other by engaging other teachers in a deeper
process of improvement. It might be reasonable that teachers are likely more threatened by the power differential in their relationship with administrators. As a result, I think that the teacher collaboration model is likely more compatible with existing norms.

The methodology I used to test the collaboration model may confuse the findings with regards to LTV and CAC. Our pilot organizations for the collaboration model were likely to be paying a premium to bring me in as a facilitator. Bundling me into the deal, while good for product development as I test our protocols, may have made our outcome LTV and CAC numbers less comparable to those for the coaching model. As the iterative learning process of launching a startup continues, we will need to test the hypothesis that I can be removed from the process and we will see similar impact.

In analyzing the results from the fall pilots, it is important for me to consider other factors that may also provide explanations for the results. There are several potential confounders. In the three to four month period between my first pitches of the coaching model and my first pitches of the teacher collaboration model, I suspect that two things in me changed. First, I likely grew more confident in my product, which might have given me more confidence in demanding larger contract values. Second, I likely grew more confident in my pitch. This may have had an effect on both average contract value because of more customer confidence in me, and on customer acquisition costs since a more effective pitch may lead to fewer meetings and follow up activities.
I suspect that all of these factors played a role in changing both lifetime value and customer acquisition costs. There are not quite enough data points to control for this effect, but I believe that the Chelsea High School example provides a longitudinal example that may help discern between the role played by me personally and the role played by each model’s respective value proposition. I made my initial pitch to them using the coaching model, but in my second meeting allowed the principal to suggest what would best serve her needs. I actually did very little pitching, but what she decided best fit her team was the teacher collaboration model that I had already begun to develop. While this anecdote cannot completely tease apart my personal impact relative to the product-market fit, I think that it does speak in favor of the teacher collaboration model.

From a business development perspective, the data still suggests a sustainable model. Our Average Contract Value was $2400 for the teacher collaboration model, and these contracts were for the support of a single team. On average, there are six of these teams in a school. As we develop a web-based platform for supporting teacher collaboration, we may find that schools are unwilling to pay that much per team for automated support. However, even going as low as $300 per team would result in an ACV of $1800 per school, which should still supply a sustainable gross margin. In the Implications for Site section, I will describe the business model that has evolved from this process.

IMPLICATIONS FOR SITE:

While I began with a model more focused on personalization of professional
development and coaching. The data from the fall pilots suggests that the teacher collaboration model better achieves product-market fit. In particular, this data initiated several important pivots that are part of our next best-guess business model. First, I shift the user from the coach to the leader of the Professional Learning Community. Second, I frame the problem as one of a lack of social capital on teams. Third, I place a technology solution at the core of this model. The revised business model below reflects each of the pivots suggested by the data from the Fall.

The Teaching Genome Business Model

The Teaching Genome changes the way that teachers talk about instruction to improve teaching and learning. We are organized as an LLC in Delaware, with our headquarters in Boston.

We operate from two core beliefs about the way that teachers talk about instruction:

**Teaching teams need more social capital**

Reform efforts like charter schools, tenure reform and site-based hiring have focused extensively on human capital, the power of choosing the right people. Most efforts have failed to prioritize an equally important resource - the development of social capital, the connections and relationships between people.

Increases in social capital have a pronounced effect on networks of practitioners of all ability levels. On average, a one standard deviation improvement on one measure of social capital has been associated with a 5.7 percentile point increase in student math
achievement (Leana 2011). Strong social capital within a team can make a mediocre teacher perform like an average teacher, and makes a high-performing team stronger relative to a similarly skilled team without social capital. The Teaching Genome builds social capital on teams.

**Teacher collaboration is like building the Tower of Babel**

Sixty-eight percent of teachers, 1.8 million of them, engage in mandatory collaboration every week. Only 7% of them think that this time is worth it, which represents a massive wasted opportunity to improve teaching and learning. They spend, on average 45 min per week engaged in collaborative activity, which can cost districts an average of $64,000 per school annually. Each year nationwide, schools spend over $5 billion on teacher collaboration, and this number is growing as more schools adopt teacher collaboration as an improvement strategy.

Talking about actual teaching practices is the 3rd rail of conversation topics among teachers. In this kind of environment, it is incredibly difficult to build the trust and shared vision needed to improve. Relationships focused on teaching practice between collaborators are weak because teachers do not have a common language for discussing differences in teaching practices. The Teaching Genome provides clear and non-judgmental language for teaching styles.

We provide a yearly subscription service to the following tools:

- The Teaching Genome Assessment: An assessment that can determine a
practitioners' teaching style - the way they perceive the act of teaching and how they operationalize that in their practice. Reports can be provided individually and rolled up to the school and district level.

- Catapult: A platform that helps create and run meetings focused on instruction. It takes data from the assessment and helps team leaders select the right protocol to build social capital as they plan meetings. It contains protocols that allow teams to:
  
  o **Surface perspectives**: Teachers can identify the different ways that team members view their work.
  
  o **Converge and align**: Team members can develop consensus around areas for improvement.
  
  o **Diagnose and support**: Teachers can identify professional development needs for the team.
  
  o **Reflect and iterate**: Teams can review outcomes and make further plans for improvement.
  
  o **Implement Curriculum**: Teams can collaborate on how to use the district curriculum.

**Market Analysis**

We target the 61% of schools that have dedicated collaboration time for teachers where teachers are deeply dissatisfied with the state of teacher collaboration.

The total addressable market includes private and public K-12 institutions whose
leaders have already dedicated funding towards establishing collaboration time. Using data from the most recent iteration of the Teachers Know Best survey, we estimate that this number is 89,000 schools. Based on our 7 current pilots, where our Average Contract Value is $2400 per school, we have a potential market of $213 M.

In the medium term, we will target schools in New England. Geographical proximity will allow us to provide outstanding customer service to our early adopters, thereby cultivating evangelists that will then help us market the product. We estimate that there are 2251 eligible schools in Rhode Island, Vermont and Massachusetts. Rhode Island and Vermont both have invested heavily in teacher collaboration.

Within 2 years, we believe that we can enter 5% (112) of these schools. At our projected ACV, we would be generating $268,800 in recurring yearly revenue.

Several data points suggest a high level of market readiness for the Teaching Genome.

- Federal dollars demonstrate top down financial support for local priorities - According to a recent analysis of the applications for federal School Improvement Grants, teacher collaboration is the most cited school improvement strategy. The US DOE awarded over $315 M in the latest round of SIG funding to more than 26 states. Moving forward, states will set aside money for school turnaround in lieu of federal funding, but the prevalence of teacher collaboration in these efforts suggests the existence of a substantial
Several notable competitors have taken on teacher collaboration - major players in the teacher professional development space have launched initiatives aimed at teacher teams. This suggests that a demand for ways to improve the way teachers work with one another. We believe that our recognition of different teaching styles provides a significant advantage over competitors.

Teachers have signaled that they want to stop wasting their collaboration time - The Teachers Know Best survey results signal a widespread dissatisfaction with the current state of teacher collaboration, which takes up millions of work hours each week. Our own content marketing blog post on improving teacher collaboration generated over 600 Facebook likes, 400 re-tweets and drove over 8000 page clicks to our site.

Competition, Competitive Position and Risk Assessment

Competitors

https://www.teachingchannel.org/professional-development-videos/teams - ($52-$75 per district user - pricing by percentage of signups to encourage volume sales) They provide a video and online collaboration platform that can support both in-person and virtual collaboration.

www.teachscape.com - (pricing differs per element, but a comprehensive system runs around $400 per teacher) a comprehensive PD system and LMS for teacher learning. Offers individualized learning plans, online professional development modules,
communities. These communities are essentially chat groups. These systems can be piped into an evaluation platform as well.

www.betterlesson.com - They are just now rolling out a professional development tool to be used to fuel teacher collaboration.

Solution Tree is the cadillac of professional learning community support. They provide high-touch consulting services directly to schools and districts to help set up their teacher collaboration.

Both Teaching Channel and TeachScape assume that teachers agree on what constitutes "good" teaching and will be able to draw meaning out of video. They assume teachers have the tools and structures to use video well. Providing video alone will not solve the gap in the quality of professional development. BetterLesson provides a protocol for collaboration, but they assume that teachers have the self-awareness and language to engage productively. They assume that social capital is built primarily around processes.

**Market Positioning:**

The Teaching Genome has several features that provide stronger performance compared to our competitors, allowing us to charge a premium.

- The Teaching Genome builds on rigorous research on social capital, which has proven effects on student achievement (Leana & Pil, 2006).

- Our proprietary assessment allows us to provide unique knowledge to individual teachers and aggregate information about teaching preferences to
team and school leaders

Our model also includes several cost savings that will allow us to compete on price while still delivering significant value to the customer:

- We will create content focused on team facilitation rather than create pedagogical or instructional content ourselves. Because video and other associated materials for running effective instructional meetings are less content or grade specific, our production costs will be much lower than any competitor that creates instructional content.

- We provide a clearinghouse to other PD providers that align to various styles. For example, we have a Montessori-style partner to whom we can connect clients after they determine that they need that kind of PD.

Risks and Mitigation Strategies

- Customers are unwilling to make a marginal purchase above and beyond allocations already made for teacher collaboration.
  - Establish a clear value pricing rationale - We have already calculated the cost of wasted meeting time and are basing our price and pitch off of that value.

- Sales complexity increases customer acquisition costs because of the need to extensively educate customers about teaching styles, social capital and collaboration time.
  - Content Marketing - We have already begun to position the Teaching
Genome as a thought leader in teacher collaboration, which should lower the cost of educating some potential customers.

- Those responsible for implementation and support at the school level may lack necessary skills to use the product effectively.
  - We are developing a series of training videos of “facilitator moves” that accompany the protocols that novice users can watch before executing the meeting. This will help highlight pitfalls and preview tactics that can help navigate these pitfalls.
  - We are establishing a partnership with the School Reform Initiative (SRI), the organization that runs trainings for facilitators of PLC’s. We will help them with customer acquisition for their conferences and they will allow us to offer more advanced training to interested users.

Marketing Strategy

- We are using three major strategies to drive sales via qualified leads:
  - A content marketing strategy based on creating value for those who lead teacher collaboration. We’ve already seen over 8000 page views from 2 blog posts, and 10% conversion rates into signups.
  - Partnering with teacher leadership organizations such as Teach Plus, NAATE, National Board, Leading Educators and TFA - These organizations train and access a network of over 40,000 per year. These teachers are leaders, taste-makers and generally hold some sway over organizational purchases and decisions. We will cultivate a
pool of champions from these organizations to generate additional sales leads, similar to how MasteryConnect generates a critical mass of free users before engaging in direct sales at a site.

- A referral system for a free version of the assessment to drive signups into our sales funnel.

This business plan outlines the model that came from the learning in the capstone.

Even as I complete the capstone process, tests are underway that will test the hypotheses embedded in this document.

IMPLICATIONS FOR SECTOR:

I spent the fall building a business around the idea that not all teachers are the same in terms of their style and that we should not pretend that they are. I thought that we needed to use teaching styles to personalize professional development. However, based on work with teachers and administrators this fall, I learned that another important use of the Teaching Genome might be to mediate the relationships between teachers, allowing them to build a deeper consensus about their vision for excellent instruction. I believe that this has implications for generating coherence in traditional school models while also laying important ground work for personalized learning models that likely constitute the future of education. In this section, I will describe some of the implications of our work in generating coherence at the school level. I will also briefly describe the current state of education entrepreneurship and how what we have learned about teaching style might empower some future visions of schooling.
The vast majority of schools are not very coherent. I define coherence as the alignment between purpose, strategy, processes and actions, and there is some data to suggest that coherence is an important characteristic of any system that is trying to improve. One needs only look as far as successful charter schools to see the power of coherence when the school's purpose and its staffing, training and support all align. Coherence in education has thus far been limited to schools that can control their human capital pipeline, like independent or charter schools that can hire people who demonstrate “fit” to the school’s mission and methods. I believe that there is a way to support the development of coherence among teams where hiring and firing is less of a tool because of restrictions arising from collective bargaining agreements.

One of the Teaching Genome’s core problem definitions was that teacher collaboration has been shown to be a high leverage strategy for improvement, but that most schools are not equipped with the tools to work together well and build coherent systems that can fuel school-level change. The data from the Teaching Genome’s initial work this spring with two professional learning communities suggest that our process can build coherence and social capital. Figure 6 shows an initial definition of rigor held by one member of a team and Figure 7 shows the group definition that the team developed using the language from their reports and the protocols that we developed.
In the end, the group came up with the following draft definition of rigor:
“Rigor is being clear about the content that they need to wrestle with, the product they will create, but to allow for ambiguity and flexibility with the structure of how they get to that product. There is structure in how they think through an issue, but students have to take responsibility for making decisions and owning how they are going to get to the outcome. This requires that they be vulnerable and will require that they ask and answer their own questions. They do this in order to reach understanding of essential questions related to the subject matter that is relevant to them.”

Examining the expanded definition of rigor for this team displayed some key elements that I think particularly set this team up for success. The statement is strategic, in that it can be used as a decision-making tool that helps discern the most aligned course of action from a field of possible choices. Unlike most “vision” or “mission” statements, this definition for rigor actually manages to exclude certain actions rather than be so generic that it does not help make decisions. The statement was detailed enough to point the direction to future improvements. The group expressed that the statement was aspirational, that they were not yet doing all of this well. After the session, the head of the department came up to me and said that he definitely felt like they were going to do things differently tomorrow, indicating that they were positioned for both individual experimentation and deeper collective work. This initial feedback supports our belief that teaching styles can help more schools reach the level of coherence that will lead to faster improvements.

Thus far, I have focused primarily on using the Teaching Genome with
relatively traditional schools, though several clients have made the move towards what the Christensen Institute’s taxonomy would call “technology-rich” rather than blended or personalized. Like many, I believe that teacher teams and schools are an important unit of change. I also believe that the funding environment’s focus on personalized learning and adaptive technologies is an important innovation for remaking schooling. However, my experience with schools attempting to personalize learning may not yet have placed enough emphasis on what will be required of teachers, teacher teams, and schools to implement new approaches. In fact, I wonder how many schools are purchasing personalized learning products in the hope that they can circumvent the lack of coherence and cohesive pedagogical approach.

This is problematic because I think there are many ways in which the role of the teacher becomes substantially more complex in the personalized or blended model. The taxonomy from the Christensen Institute focuses mostly on logistics, with each model describing where students are and what they are doing in each phase of the learning process. However, instruction is more than the sum of applications to use and deploy, and seating and grouping arrangements. There are still instructional choices to be made that are expressed in many interstitial moments in the interaction between student and teacher. What I call “mini-moves”, the way that a teacher sets norms, frames activities, and gives feedback are all examples of teacher actions that vary widely between teachers on teams and are not provisioned for by most products.

Based on my experience both developing and using the Teaching Genome, these choices have a critical impact on whether students actually develop the kind of agency and ownership that personalized learning is supposed to
engender. Personalization and ownership of learning are not new concepts, and several pedagogical styles have well-developed approaches that combine these teacher “mini-moves” with curriculum, learning activities and assessment in a coherent way.

For example, Montessori teachers are trained extensively to respond to student questions and difficulties in a way that puts agency back onto the student, so that students take greater ownership of the learning process (Cossentino, 2009). What matters is that the Montessori-style mini-moves align with the manipulatives and resources that are used in the classroom, and consistent with other norms that are established and reinforced throughout the year. When a student struggles with counting beads, the teacher is likely to already know the misconception, know the limitations of the counting beads, have two or three follow up questions that can prompt additional thinking. Additionally, the teacher can rest assured that norms around multiple attempts and persistence have already been laid down and reinforced by other students and other teachers in the child’s history. This kind of coherence is rare in traditional schools, and potentially even more difficult if schools are implementing a combination of personalized learning tools.

Should schools build their model around available technologies, developing an instructional model around the technologies that line employees will have to use? Or are schools more effective when they develop a robust instructional model that guides the selection of instructional tools that further personalized learning? Either way, there are important decisions to be made about instruction outside of logistics and choosing the right tools. Students need framing and guidance to take full
advantage of personalized learning. Consequently, the adults in the building need to develop coherent views about the best way to support students.

My experience with the school that generated the rigor definition above suggests that it may be better for schools to develop robust pedagogical approaches. There are too many divergent ways to view the role of technology, too many different purposes for school that are rarely discussed but will make all the difference when properly implementing a given technology. Without the role of the teacher floats precariously in the limbo between past and future. This is a natural inflection point in any period of rapid innovation, but resolving it will have important implications for the teaching profession and its relationship to learning in an era of personalization.

IMPLICATIONS FOR SELF

Entrepreneurship was a difficult enterprise, but a deeply fulfilling one. The work was sometimes lonely, self-referential, requiring of a bravado I didn't always feel. Additionally, it forced me to take a different altitude to the work than I ever had before.

I had to hold many perspectives in my head at once. I was not a teacher, not a coach, not an administrator and certainly not a funder, but I had to hold all of these viewpoints and interests in my head at once if I was to make a business that was successful and still act in fidelity to teachers and students. Teachers certainly have to manage multiple perspectives, but many of them can be bucketed into the single domain of "student" for many purposes. As a senior leader at TFA, I certainly had a sense of many views on our work, externally and internally. However, outside of a
few cases, my work as the leader of professional development for our 150 teachers
did not frequently require that I juggle that many outside perspectives on a day to day
basis.

I had to take a different approach to my work as an entrepreneur. All of my
work streams intersected much more intensely, and therefore the stakeholders that I
had to consider in doing my work also had to change. Product development had to
consider what would create a compelling narrative to potential funders, and potential
value propositions needed to align with what I knew customers needed and wanted,
and so on and so on. If funders represent one kind of decision maker, then I have
always had decision makers in my professional life above me, but this was the first
time in my professional career when there was such a wide divide between our areas
of expertise and knowledge bases. I struggled early to appropriately tailor my
presentations to an audience with relatively little understanding of educational issues.

Even as I needed to expand my state of mind to include many stakeholders,
the work of an entrepreneur is focused on extremely narrow problems. This too was a
departure from my previous work experiences. As a teacher, I was constantly thinking
about multiple aspects of my students’ lives and our school community, even as my
primary work was in the classroom. Similarly at TFA, there were a lot of different
“problems” I was solving for on any given day, from hammering out logistics of our
university partnership to planning a workshop.

Working on the Teaching Genome gave me many different types of work
also, but required a myopic focus on solving the one core problem that I had framed
for the business. I appreciated this focus, but over the course of the year, I found
myself needing to feed a different part of my commitment to equity in education. I began engaging more deeply in my community at Old South Church where I was a deacon for several years before graduate school. I got involved with organizing their work to improve public education in Boston, avoiding instructional-level work and focusing much more on the systemic barriers to equity within the system. It was as if the narrowness of the focus of my work was “backing up” my desire to engage more systemically and I had to find a release valve for that energy.

I have struggled to find my own identity as an entrepreneur. I learned that there are at least two narratives for entrepreneurship. One narrative for the entrepreneur is what I might call the “Lean” entrepreneur. This archetype focuses on iteration, adapting, and pivoting. Through the Lean process, this entrepreneur engages with multiple perspectives and synthesizes them, and continues to be open to pivoting while proceeding. The other major archetype focuses on the idea and commits to it without wavering.

I knew that both of these archetypes existed in my head, but I found myself reacting strongly when I took on either archetype and was rebuffed. In my first pitch for funding in the fall, I got the feedback with my rejection that I did not seem open to pivoting on my product idea. In reflecting on my reaction to that news, I reacted angrily to that characterization of myself because I felt that it insulted both my intellectual capabilities and also assumed that I had an overdeveloped sense of pride or investment in one model. I had chosen to adopt the bullish, highly committed archetype and it was not aligned with this particular funder’s vision for entrepreneurship.
In my second attempt to pitch for funding, I adopted a more reflective and open approach and got dinged for not being committed enough to my idea. I was also upset upon getting this feedback, both because I had tried something and failed but also because I really dislike having my commitment questioned. There is work to be done to figure out the balance between these two archetypes, and this is personal work for at least a few reasons. On one level, it is about being authentic, but as a recent article by Herminia Ibarra suggests, the idea of authenticity is not as simple as it sounds. She describes research around two psychological types for leaders: high self-monitors (“chameleons”) and low self-monitors (“true-to-selfers”) (Ibarra, 2015). A chameleon is aware of perceptions and might try multiple times to get the right fit between message and receiver, and a true-to-selfer may speak their mind regardless of the context. Both have pitfalls, but I think that I fit more into the chameleon category where the pitfalls are coming across as disingenuous. The article ends by making the case for adopting a “playful frame of mind” in trying on new leadership behaviors and learning from experience rather than spending too much time reflecting before acting and experimenting.

I interpret the mindset needed to succeed in entrepreneurship slightly differently. I believe that my commitment to the Teaching Genome has “tiers” or “hierarchies” that exist at different levels of abstraction. The highest level is an axiomatic belief in the idea that teachers differ from one another in deep and fundamental ways and that all educators need to respect and account for these differences in their instructional leadership. One level down involves a definitional belief in the idea that there are five distinct of teaching styles and an assessment that
can help educators articulate the nature of these differences between them. I have found that my commitment to the core belief that teachers are different in terms of style is unwavering and that I have only slightly less confidence in our construct and instrument.

The lowest level is one of the tool or intervention, where the axiom is operationalized at the interface of one’s beliefs and the real world. In this capstone, I chronicled the process of discerning the impact and sustainability of two different models of what might happen at this tier, how I was going to take my idea of teaching styles and make change on the ground. At the end of the day, my emotional investment and commitment to any particular iteration of this tier is low. My experience as an entrepreneur showed me that this kind of loose commitment to any version of your product is an absolute necessity. The Lean process delivers a constant stream of data that validates or invalidates elements of a given product and being overly committed to any model could result in the fatal error of not listening to critical information about how your product serves user needs.

I have learned that the act of entrepreneurship involves taking some things on faith, choosing some ideas to be taken as given. Having this deep commitment to certain ideas make it possible to withstand the extreme variability and malleability of other parts of the work. Axiomatic and dogmatic belief has a place in entrepreneurship, but I have learned to be careful about where the “unshakable faith” manifests. My experience in the residency taught me that my entrepreneurial work is best served by not attaching to closely to any feature, target user, or even particular problem. My axiomatic belief and commitment lives at the level of how people
perceive the act of teaching, which allows for flexibility in how that shift in perception comes about.

Not being clear about these varying levels of commitment to various aspects of conceptualizing the Teaching Genome impacted my work in several ways. The lack of clarity impaired my ability to clearly define the problem because I hadn’t clearly situated what the work of the Teaching Genome was at its core. In reflection, this hampered my ability to pivot, especially as it involved redefining my problem definition and target customer.

As I moved through the process of defining my core values related to this work, I realized that I have a deep commitment to teacher empowerment and professionalism, to the belief that teachers have expertise that needs to be acknowledged, cultivated and harnessed in order to improve outcomes for students. I uncovered this commitment by examining my reactions to each pivot this year. Shifting from the personalized professional development pivot to coaching took me an altitude away from the teacher, which produced some discomfort in me. I felt this discomfort dissipate with the shift towards professional learning communities and have felt it return as I have felt pressure to use the Teaching Genome as a remedy for principal pain points around instructional leadership. While the literature is clear on the power of principal leadership, I have become increasingly aware of my own commitment to developing the agency of teachers to develop a sense of their professional identities and practices.

In finding the balance between the Lean and “hell-or-high-water” archetypes, I will need to continue to be open to the feedback I receive from the environment and
make sure that I am keeping my ultimate objective in mind. I need to continue to cultivate other ways of satisfying the parts of me that want to think about systemic changes and recognize that while I might commit to one aspect of the sector, this problem does not define me as an actor in the educational space. Additionally, my self-worth is not connected to any individual failure in this process. At the end of the day, I know that I am committed to the work of teaching and learning, and doing so in a way that truly respects the diversity of approaches I know is out there.

CONCLUSION

The story of this capstone mirrors that of many startups. I began this process with an idea for a product and a vision for the change I wanted to see in the world of education. The product I ended up with at the end was something quite different from that original vision and even in the time of writing this capstone, it has continued to evolve still. I had expected pivots and I had chosen the Lean method to manage disruptions from the learning process. However, as Heifetz notes in his work on adaptive leadership, change is loss and the process of pivoting from one model to the next involves saying goodbye to a great many things (Heifetz & Linsky, 2002).

As the data came in, and I moved from personalized professional development to coaching, I felt like I was getting further away from empowering teachers. The turn towards teacher collaboration came back to the idea of putting teachers at the center of their own development. I have to admit that I potentially became overly enamored of teacher collaboration use case because it spoke to this desire to empower teachers
with knowledge and resources to develop a professional identity as both individuals and as a group of collaborators.

In this process, I have come to understand my core vision for change centers on creating a teaching profession that recognizes important differences between teachers in a way that harnesses that diversity rather than papers over it. This vision for impact does not definitively require any teacher empowerment, so this process has helped me discern that I have values that drive my commitment to this work that exist under the surface of my conscious vision.

These “under the surface” values will have real implications for my strategy. Recent interviews with principals and district administrators suggest that they want a product that will improve their instructional leadership. They want a product that will help them develop an instructional vision for the school and to run meetings that will help them communicate and execute against that vision. Districts want a tool that will help them “keep tabs” on the meetings that are occurring at the school level.

My immediate reaction to this possibility is one of disappointment, a feeling that reflects the challenges of entrepreneurship in K-12 education. Procurement processes put control for most purchases in the hands of principals or district administrators, and therefore products end up aligning to their pain points over those of teachers, coaches or department heads (Berger & Stevenson, 2007). While I can still see a line that connects this theory of action to my vision for impact, that compliance-oriented features seem to be most attractive to the largest clients means that sustainability and viability may run counter to some of the other values that drive my commitment to this work.
This capstone has been the process of driving towards product-market fit to build a business that attains both sustainability and impact. The evidence suggests that the Teaching Genome has moved closer to fit, that in pivoting to teacher collaboration, I got closer to “finding” this theoretical market with specific and powerful needs. I want to close this capstone by reflecting on this frame, highlighting a problematic element of the frame and suggesting a way forward.

This conceptualization of the market frames it as something passive, something that can be “found” rather than created, whose pain points are there to be discovered and addressed through the product. In this frame, my job was to pick the lock of customer needs by crafting the right key. This frame restricts the possibility that the market can be created for a product when the potential customer base is not even aware they have the pain point.

Thinking about the market as an entity with clearly defined needs that merely need to be discovered and addressed is particularly problematic for companies like the Teaching Genome. The Teaching Genome reframes the nature of the teaching profession by providing a new way of thinking about teachers’ professional identities. I wonder if it is possible for a profession to have suppressed a pain point so long and so deeply that it is numb to it. In my experience, teachers suppress differences between each other when they are working in teams in order to prevent conflict. Differences in how to think about teaching are suppressed, but bubble up in other ways that undermine improvement.

For example, I received an email from a client describing a breakthrough catalyzed by the Teaching Genome. I had piloted a series of protocols with this high
school math professional learning community that brought them to a deeper understanding of their own teaching styles and some of the differences between them. This professional learning community leader constructed a new protocol and deployed it with her group. She asked them to go off and plan separate versions of a lesson for the same objective. She said that she “used Teacher Genome language to explicitly frame the purpose of this as noticing divergent moments in the lessons”.

She went on to describe a series of learning activities based around the Teaching Genome, expressing the following anecdote where names have been changed for confidentiality:

“I pushed Amy and Jenna about the place where they differed most to say why they would NOT do it the way the other person had. This turned the heat WAY up, but surfaced so many things that had been going unsaid about where each of them felt kids were, what they believe helps kids learn, and -- interestingly -- the role that a teacher's authority plays in a classroom. Jenna came to me the next day and said, ‘That PLC sparked a really long talk between Nate and I about teachers and authority...we see things very differently...’

“I was also sent an email by one of the geo team members about getting in a fight with someone else on the team last year in a dept meeting and that ‘things have clearly changed over time and I am starting to understand ___ better...But what I didn't think about at the time was a) [that person's] "bets" were different from my "bets" (b) they had/have a lot of fears that were not voiced at the time that I have come to learn about since then. Fears lead to irrational defense mechanisms.'”

After working with these teachers and this leader for three weeks, I feel confident that none of them at the outset would have listed a lack of common knowledge of teaching styles as the core pain point in their professional learning community or their practice as an individual teacher. The frame I understood for most startups is to search out product-market fit by finding a market with a need and serving that need with an aligned product. At the end of one phase of this process, I am left wondering if the right mix of product and marketing can create the market by uncovering a pain point that users were only barely aware of. Andreessen talks about VMWare’s initial products creating a massive market for running Windows on Macs and vice versa, but
couches this case study in how absolutely rare it is for this to happen (“Understanding SaaS: Why the Pundits Have It Wrong | Andreessen Horowitz,” n.d.).

A cynical view would suggest that market creation is a function of clever marketing. Indeed, clever content marketing that educates potential users might be the right next step for the Teaching Genome. The fact remains however that the product may still stray from the original vision for impact if current procurement methods still place control in the hands of decision-makers who do not feel the same pain points as the target customer. I may spend a lot of time educating teachers and possibly even principals about teaching styles and about the importance of acknowledging them, but until we either appeal to the pain points of decision-makers or create channels that allow users to influence decision-makers, then scaled impact will remain that more elusive. It may be possible to create, rather than merely find, the market. However, if the constituents of that market are consistently disempowered, the interventions available to improve teaching and learning will continue to disproportionately reflect the values of those who make spend the money and make the decisions. As an entrepreneur, I will continue to wrestle with how I navigate this tension and how much of an uphill battle I fight to realize my vision for a more effective education sector.
Bibliography


### Theory of Learning

#### Students learn best when…

<table>
<thead>
<tr>
<th>Teaching as Project Based Exploration</th>
<th>Teaching as Developing Individual Agency</th>
<th>Teaching as Efficient Coaching</th>
<th>Teaching as Collective Facilitation</th>
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</thead>
<tbody>
<tr>
<td>Example: Expeditionary Learning</td>
<td>Example: Montessori</td>
<td>Example: Teach Like a Champion</td>
<td>Example: Harkness</td>
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<tr>
<td>They are cognitively and emotionally engaged by a rich topic with real-world importance.</td>
<td>They have freedom (choice, pace, time) within structure (materials, procedures, interaction with materials).</td>
<td>They experience collective pressure and support to meet behavioral and academic norms and expectations.</td>
<td>They collaborate explore answers to a complex question.</td>
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<td>They get outside the walls of the classroom.</td>
<td>They are completely engaged in a task.</td>
<td>They feel a sense of ongoing accomplishment for meeting commonly recognized benchmarks of mastery.</td>
<td>They operate as a team to uncover the meaning of text or material.</td>
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<td>They see a connection to their own lives and communities.</td>
<td>They develop curiosity grounded in knowledge.</td>
<td>They experience a highly consistent daily structure for how learning happens.</td>
<td>They exercise control (with reasonable limits and accountability) over the direction of a discussion.</td>
</tr>
<tr>
<td>They experience a sense of discovery.</td>
<td>They are engaged in a prepared environment and allowed to act on their intrinsic nature to learn.</td>
<td>They are in a highly structured environment with high behavioral expectations and consistent personal consequences for misbehaviors.</td>
<td>They ask difficult questions of each other.</td>
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<td>They reflect on their own learning process.</td>
<td></td>
<td>They learn content that has been broken down into discrete pieces that are meant to be mastered in sequence and spiraled back to repeatedly until mastery has been achieved.</td>
<td>They subsume their own egos and self in favor of deeper understanding of the material, prioritizing self-monitoring of the discussion rather than trying to look smart.</td>
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<tr>
<td>They feel supported by their teachers, parents and mentors in the community.</td>
<td></td>
<td>They get many &quot;at bats&quot; to practice mastering content.</td>
<td>They make their own meaning and meeting their personal learning objectives.</td>
</tr>
<tr>
<td>Historical Antecedent(s)</td>
<td>What style(s), philosophies, and does this teaching style derive from?</td>
<td>What style(s), philosophies, and does this teaching style derive from?</td>
<td>What style(s), philosophies, and does this teaching style derive from?</td>
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<td></td>
<td>Outward Bound is its most proximal antecedent, coming from the traditions of wilderness education. Influenced by writings of Muir and Thoreau, and their belief that people learn from nature.</td>
<td>development, stems from Rousseau and the progressive educational philosophers. Children go through developmental stages.</td>
<td>Behavioralism</td>
</tr>
<tr>
<td>Purpose</td>
<td>Students learn so that…. They can develop the experience, character, and skills necessary to make real world decisions that enhance themselves and the communities around them. Students should develop resiliency, perseverance and the ability to understand and follow their interests and passions.</td>
<td>Students learn so that…. They can be peaceful, mindful, independent citizens who can bring humanity into harmony with the natural order. If we create the right conditions, children will show us their true potential, their natural peacefulness, and they will teach us.</td>
<td>Students learn so that…. They can go to and through college and thereby change their economic trajectory because going to college is the only way to be successful in society. College provides an opportunity for economic attainment that provides life choices that mirror the freedoms available to middle and high income Americans.</td>
</tr>
<tr>
<td>Curriculum</td>
<td>Students should learn… Students should learn a rigorous college-preparatory curriculum that is rooted in real-world experiences. Through structured learning experiences, students learn not only</td>
<td>Students should learn… Students should learn numeracy, literacy, science, practical life, culture. Curriculum broadly moves from: self and immediate surroundings to self</td>
<td>Students should learn… Students should learn the skills necessary to get into and succeed in college with an emphasis on academic writing that will give them personal, political and economic empowerment</td>
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content but also focus their attention on character building and creating high quality products. And people around me to self within broader world, so that students learn to take control over their own learning by paying close attention to the world around them and so that they learn to foster a sense of mindfulness. Through accessing the power culture. College preparedness is thought of both in terms of academic content and also non-cog skills. The most emphasized non-cognitive skills are persistence and discipline and resiliency.

| Learning Environment | Physical Setup - Within the classroom, students are usually in groups that are the center of collaboration on project work. Culturally - Students should have a recurring group that serves a non-academic function that supports their learning of process skills related to socio-emotional learning and other non-cognitive skills. This often takes the form of advisories. Procedures and Routines – Instructional routines vary, but there are structures that focus attention and reflection on character traits. Students are encouraged to respect the diverse viewpoints of others and have a safe space to explore their place in the community of the advisory/classroom. Discussions of different types of diversity within the subjects. Teachers and departments choose texts, which form the basis of curriculum. The exact texts aren’t as important as the skills they allow the students to practice. | The operational environment is set up in such a way that… There is heavy control of the environment and the learning material to create calm, focus, respect, curiosity. Physical set up - Design of the classroom is dominated by the idea that the physical environment is “the third teacher.” There is only one set of each of the learning materials so that students must share and learn how to arbitrate between one another. There should be nothing on the walls (too much stimulus). Very neat and ordered. Wood walls. The room is broken into subjects. Culturally (Mindsets, Expectations) - Students learn to respect the learning of other students in the classroom, and take ownership over their own learning. Through Procedures and Routines - Teacher demands respect from students at all times, and teacher determines the cultural norms of the classroom. Students are held accountable for meeting those expectations. Procedures and routines are practiced to mastery and deviations from those norms are dealt with swiftly by the teacher. Very small things are dealt with quickly and early so that they do not become bigger issues. | The operational environment is set up in such a way that… Physical set up - Rows of tables and chairs with teachers free to circulate around room. Culturally (Mindsets, Expectations) - Mindsets are focused on success, respect for rules is paramount, everyone promotes a growth mindset. Through Procedures and Routines - There are several different types discussion formats that a class may cycle through and each one has different protocols that imply different procedures and routines. Focus is NOT on documenting learning, the learning is through the process of discussion. |
advisory and society are part of the curriculum and seek to create this environment of respect and personal exploration. The advisory-based looping structure allows students intimately know each other and their advisor. Student leadership, inside the advisory, and in the school at large are important ways to build community.

Motivation – Student engagement comes from primarily from the selection of topics for the projects and the accountability of group work.

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<tr>
<th>Planning</th>
<th>The delivery of content and the development of skills is done so that…</th>
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<tbody>
<tr>
<td>Over the year? - The teacher, or team of teachers, plans a series of units, each of which is linked to a capstone experience that puts the work into a real-world context. The planning involves both an arc of content and a skill and character development arc. At the unit level? – Teachers often start with an immersive event in order to build engagement, but may choose to put the real-world experience at the beginning or end of the unit depending on which will serve the pedagogical needs of the unit. Projects form the core learning experience.</td>
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<td>The delivery of content and the development of skills is done so that… The planning is done lesson by lesson following the students’ need. Having the curriculum and the environment ready allows the guide to focus on the children. The fundamentals are delivered in as simple and precise a way as possible so that the teacher can quickly get out of the way and allow the students to take control of the learning.</td>
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<tr>
<td>The delivery of content and the development of skills is done so that… Over the year? Plans for the yearlong delivery of content are dictated by the sequence most likely to result in mastery beyond the level of state assessments. At the “unit” level? All teachers generally use the same long-term and unit plans which mirror some elements of UBD, but generally without performance assessments. At the daily level? Daily lesson plans follow backwards planning philosophy with 5 major steps: Do Now, Hook, Introduction to New Material, Guided Practice, Independent Practice and</td>
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<td>The delivery of content and the development of skills is done so that… Instructor thinks carefully about the selection of texts and the discussion method that will best meet the objectives. (Bubble Up, General to Particular, Particular to General, Top Down). Over the year? Teachers think about thematic progression over the year so that students are coming to understanding of themes. Additionally, they are thinking much more about skills rather than about specific content. At the “unit” and “daily” level? Planning at the unit and daily level is</td>
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</table>
experiences at the unit level.

At the daily level? – Teachers plan how the work on the project will unfold from day to day.

closing. Lesson and unit plans are generally tightly planned down to the level of specific teacher and student actions.

about coming up with questions that challenge, resist easy answers, and highlight the central tensions with the texts. Additionally, these questions need to lead students to deeper understanding about how the material informs their knowledge and conceptions about the world. Teachers in this style do not start with objectives and are not about choreographing experiences for students.

### Execution

<table>
<thead>
<tr>
<th>Instructional Execution</th>
<th>Delivering Content</th>
<th>Facilitating Practice</th>
<th>Checking for Understanding</th>
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</thead>
<tbody>
<tr>
<td>Teacher plays the role of facilitating learning experiences for the students and structuring the reflection and debriefing opportunities that allow the students to consolidate learning from experiences.</td>
<td>Delivering Content - There is a specific way that a teacher should deliver each lesson: 1. Naming the new knowledge, 2. Supporting Recognition and Association, and then 3. Facilitating Recall. The delivery is done by a teacher for one or two children.</td>
<td>Facilitating Practice - Teacher interjects with different types of questions (open-action, hypothetical, action…) in order to further the discussion. Teacher considers the skills around contributing to discussion. Gives feedback about the way in which students engage.</td>
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<td>Delivering Content - Teachers connect students to authentic experiences that allow students to explore passions and interests.</td>
<td>Facilitating Practice - Guided by students – teacher helps maintain attention and focus.</td>
<td>Checking for Understanding – Ensuring students cite textual evidence for claims</td>
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<tr>
<td>Facilitating Practice - The teacher manages the protocols that students use to make sense of the real-world, authentic experiences that form the core of true learning.</td>
<td>Checking for Understanding - Through individual check ins with students.</td>
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<td>Checking for Understanding - Through consultations with students during advising meetings and through observation of the</td>
<td>Responding/Adjusting Instruction to Misunderstandings - If a teacher saw a</td>
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<td>Management</td>
<td>Responses are framed in the context of shared and publicly established values.</td>
<td>As much as possible, teachers should refrain from explicit rewards or punishments for behavior. Extrinsic motivation takes the power away from the child and puts the pressure on them to perform for you. Teachers take the time to observe and understand each child’s individual needs and what kind of interventions each child will need to move closer to being effectively socialized. The role of the teacher is to give appropriate help to support the child to move forward. Teachers are responsible for holding students to the behavioral expectations uniformly, without exception. Minor disruptions are “nipped in the bud” and sweating the small stuff is seen as a way of preventing larger issues.</td>
<td>Teachers are responsible for cultivating a generosity and openness to ideas among all the members of the classroom community. Because learning is a shared enterprise of the whole community, disruptions are usually addressed based on the action or comment and how it impacts the discussion. More severe behavioral issues may be handled in a private discussion outside of class.</td>
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</tbody>
</table>
it will be avoided in the future. come back from the deviation from positive behavior. The teacher’s role is to find a way to channel the child’s energy into something more productive.

| Assessment | Student Learning is Assessed: How often? – Assessments are usually done at the end of a project. Though informal daily assessments of student learning are common. With what instruments? - Much of the assessment is through execution of performance assessments made up of authentic tasks, usually in the form of externally facing product or performance. Common rubrics are typically used across teachers. Community members can also be involved in the assessment process in order to further increase authenticity and real-world applicability. For what purpose? - To determine the student’s individual mastery of both content and skills, as well as determine the extent to which the student displayed the character traits selected by the school community. The performative assessment and the application of the rubric by a broad cross-section of the community is also meant to make the connection that learning has real application in | Student Learning is Assessed: How often? – Assessment is done constantly. With what instruments? - As much as possible, assessment is highly individualized, qualitative, and authentic. It is constant, deep observation, recording, and reflection. The primary measure of student learning is observation, embodying the very essence of “formative assessment”, determining where the student is in their formation and meeting of skill based benchmarks and considering new learning experiences to meet those needs. For what purpose? - Teacher is observing how the students are using the materials, when they have mastered a concept, and when they are ready to move onto the next step. | Student Learning is Assessed: How often? - Paper and pencil assessments are frequently used to capture mastery, typically weekly. Exit slips are always used to capture objective level mastery at the daily level. Many teachers use weekly quizzes to assess progress towards broader unit level understandings. Unit assessments assess “enduring understandings” and application of material or state standards level mastery, depending on the school. With what instruments? - Most assessments are a mix of multiple choice and open response questions. For what purpose? - Continuous improvement and mastery at every level. Results inform new strategies at both the classroom and school level and responsive teaching. Mastery results are also used to motivate students and staff in ongoing progress. The school results also have important implications in terms of governing board expectations and accountability requirements. | Student Learning is Assessed: The teachers should determine how he or she will assess student discussion and how this assessment will be reflected in grades. This may sometimes be done in collaboration with students. Writing also features prominently as the ideal instrument for determining student understanding. How often? - Every discussion. Writing assignments or other assessments may be given more periodically to assess unit-level understanding. discussion. Papers and other assessments are given more periodically. With what instruments? - The teacher should create a map of who has talked and how often. The teacher should keep track of dynamics in the classroom during the discussion, for example, who builds upon the comments made by others, and who seems to dominate the discussion without bringing other viewpoints in. |
the world.

For what purpose?
Motivating students to participate frequently and with purpose. Motivate student to behave in ways that support the larger discussion. Modeling for students how to reflect on group dynamics.
Appendix B: The Teaching Genome Assessment Report Sample

Teaching Genome Report for

Theory of Learning

- Teaching as Collective Facilitation (10%)
- Teaching as Project Based Exploration (15%)
- Teaching as Developing Individual Agency (25%)
- Teaching as Efficient Coaching (50%)

Teaching as Efficient Coaching - Most Inclined
- Students experience collective pressure and support to meet behavioral and academic norms and expectations.
- Students feel a sense of ongoing accomplishment for meeting commonly recognized benchmarks of mastery.
- Students experience a highly consistent daily structure for how learning happens.
- Students are in a highly structured environment with high behavioral expectations and consistent personal consequences for misbehaviors.
- Students learn content that has been broken down into discrete pieces that are meant to be mastered in sequence and spiraled back to repeatedly until mastery has been achieved.
- Students get many "at bats" to practice mastering content.
- They get frequent and consistent feedback on mastery against absolute benchmarks.
- Students feel a sense of urgency.

Teaching as Collective Facilitation - Least Inclined
- Students collaborate explore answers to a complex question.
- Students operate as a team to uncover the meaning of text or material.
- Students exercise control (with reasonable limits and accountability) over the direction of a discussion.
- Students ask difficult questions of each other.
- Students subsume their own egos and self in favor of deeper understanding of the material, prioritizing self-monitoring of the discussion rather than trying to look smart.
- Students make their own meaning and meeting their personal learning objectives.
APPENDIX C

Plus Delta Notes from Chelsea High School Pilot:

Plus
Fun doing this
Appreciate timing/approach
Wrestling with nature of coach/leader - nice to get a concrete framework and lens for instructional leadership across styles
Process for uncovering the styles - starting with examples
Style - self - coachee was a nice progression
Application through Nick - how to coach acknowledging styles.
Small groups was a good format.
Case studies solidify learning
4 A’s helped
Thinking about how my style affects giving feedback
Intro to styles worked - solid understanding
Frames of reference for preferences makes sense.
Progression from “pure” to mixed examples was really helpful in understanding self as “hybrid creature” - double plus
acknowledging strengths of various styles.
Matching of papers to posters could be useful -(WHAT’S THE DIFFERENTIATOR?)

Deltas
Clarify the frame/mindset/experience base for the assessment
This is a lot of information and how to transfer into practice?
Struggle with the Nick exercise - in this and with a few others: clarity of task.
Dissonance around previous coaching
Wish for more collective conversation
Balance between small and whole group discussion
Takes a lot of practice to process impact of lens
Need more time to understand self and own preferences
How do we deepen the learning?
More time to unpack coaching moves
Matching of papers to posters didn’t feel totally purposeful.
Need more time to unpack self - PLC driver?

Come back and consider the nature of interaction with school purpose, UBD, coaching and TG?
Could we do a process where we define terms like “support”, “scaffold” etc in the context of CHS and various styles.