

Brian Leonard M.S.
Leonard Consulting and Training LLC
March 17, 2006

Lean Methods in the Classroom

Lean methodology has gained popularity in nearly all industries; however, these methods have yet to be fully considered in education. There is a genuine need to improve the effectiveness of the education system. By focusing on improving quality and eliminating waste in the process one can more accurately align learning activities with learning objectives in support of the organizational aim. The same improvements we see in manufacturing are possible in course development and planning. One must begin by clearly identifying the aim of a course and the objectives. As such, the emphasis on grades should no longer be the point of focus. Deming¹ suggested the elimination of grades several decades ago, claiming that grades are not the aim of education; *learning* is the aim.

Lean methodology demands a very customer-driven and quality-driven approach. In order to establish the aim and objectives it is critical to clearly identify the customer and their needs. In doing so one should include both internal and external customers in the same manner applied in manufacturing. The internal customers are the students. More importantly, the external customers are the businesses that recruit these students. This identification of customers may appear obvious but institutions of higher learning often do not place enough emphasis on meeting the customer's very specific needs. Universities begin course development as a result of input of business leaders, but involvement beyond this point is limited. This relationship should continue throughout the process of development and delivery of course material.

Once the aim is established the objectives and activities can be developed. This, in fact, is when value stream identification and mapping become an integral part of course development. In a manufacturing or service industry value stream mapping begins with identifying the value stream product. Once the product is understood we start mapping from the end of the process. If we were building an automobile we start our mapping with the finished product in the hands of the customer. We then walk upstream and map all activities in that process. In course development the concept is similar.

The aim of a course is also the value stream product. For example, if a local business teamed up with a university to develop a computer course they would begin by clarifying the course aim. They may state that they are seeking graduates highly knowledgeable in Microsoft

Brian Leonard M.S.
Leonard Consulting and Training LLC
March 17, 2006

Office products. The value stream product would be students that are highly knowledgeable in Microsoft Office products.

At this point, it must be determined how to design and deliver a course that produces the specific product; nothing more and nothing less. Supporting objectives may include demonstrated skills in Excel, Word, Access, Outlook, and Project, for example. The learning activities must then be aligned with these objectives; nothing more and nothing less.

Using this same example, course development and lesson planning should be outlined as follows:

- Aim/Value Stream Product: Demonstrated proficiency in Microsoft Office Products
 - Enabling Objective 1: Demonstrated proficiency in Excel
 - List all needed supplies and materials
 - List all learning activities
 - Assessment
 - Enabling Objective 2: Demonstrated proficiency in Word
 - List all needed supplies and materials
 - List all learning activities
 - Assessment
 - Enabling Objective 3: Demonstrated proficiency in Access
 - List all needed supplies and materials
 - List all learning activities
 - Assessment
 - Enabling Objective 4: Demonstrated proficiency in Outlook
 - List all needed supplies and materials
 - List all learning activities
 - Assessment
 - Enabling Objective 5: Demonstrated proficiency in Project
 - List all needed supplies and materials
 - List all learning activities
 - Assessment
 - Final Assessment

Of course, this approach in planning and development is quite common. This method of design is simply competency based instruction; however, implementing lean methodology requires more effort on the part of course developers and instructors. Mastery of the customer-defined aim of the course, the value stream product, and each enabling objective should be defined by the external customer. As with any lean initiative one must scrutinize the entire process and all components.

From this perspective, the learning process should not differ from a manufacturing process. All supplies and materials serve a specific purpose, are of the highest quality, and are free of waste. If supplies and materials add no value as defined by the customer, they should not be required. This may, in fact, dictate that textbooks utilized in the classroom are revised. If only 200 of 500 pages of a text are needed to meet the aim of the course, the remaining 300 pages are waste. This can be addressed by compiling material from several publications into one *course-specific* textbook.

The same applies to learning activities. Only activities that directly add value and support the course aim should be expected of the students. This leads us to the types of waste and how they apply to education. The common types of waste and examples in education are as follows:

- Transportation:
 - Example: The overall travel distance to and from the classroom.
 - Possible Solutions: By delivering only value-added content and activities the classroom time can be reduced, thereby requiring fewer classroom sessions.
 - E-learning (This would be the most effective solution with respect to transportation)
- Overproduction
 - Example: Including course content that exceeds course objectives as defined by the customer
 - Possible Solutions: Limit activities and lecture material to only what is absolutely required to achieve the course aim
- Motion
 - Example: Essay or similar exams that do not truly assess the level of proficiency

Brian Leonard M.S.
Leonard Consulting and Training LLC
March 17, 2006

- Possible Solutions: Exams should require students to produce a sample of course content only. Eliminate “rote memorization”.
- Defects/Scrap
 - Example: Any student that does not meet the established level of mastery as defined by the customers
 - Possible Solutions: More effective lesson design and delivery in addition to active learning strategies
 - Example: Any instructor that is incapable of effectively teaching the material as defined by the customers
 - Possible Solutions: Collaboration with businesses to design courses and delivery methods
- Waiting
 - Example: A student has mastered a segment of the course material but can not move forward until the entire class has mastered the material
 - Possible Solutions: Self-paced e-learning and 24 hour access to material, including assessments and evaluations,
- Inventory
 - Example: Multiple textbooks that will only be partially covered in a course
 - Possible Solution: Each course should have one course pack that includes nothing more and nothing less than the required material
- Process (Over-processing)
 - Example: Including course content not specified as critical to the customer
 - Possible Solutions: Limit activities and lecture material to only what is absolutely required to achieve the course aim.

These are merely a few examples. Accurately identifying waste in the process will differ and should be routinely investigated by course designers, instructors, students, and business leaders.

Another reason to reduce the emphasis on grades is that it has little to do with customer needs. If a customer states that a successful candidate must demonstrate 80% mastery of course material, anything below 80% is a defect. If the customer states that 50% mastery is sufficient,

Brian Leonard M.S.
Leonard Consulting and Training LLC
March 17, 2006

anything above 50% is a quality product. The processes must be capable of meeting customer needs; again, nothing more, nothing less. Quality must be based solely on customer needs. Student mastery is not always accurately represented by grades.

Many would argue that this approach would in fact impede the learning experience, as there would be little face-to-face contact with instructors and peers. However, with the growing interest and advances in e-learning, we are already facing this same dilemma. One should ask in response, is the face-to-face contact critical in the actual process of achieving course objectives? Is it critical in the learning process? We have established in numerous industries that a significant obstacle to progress is the resistance to change simply because *this is how it has always been done*. The face-to-face contact may be enjoyable to some and unpleasant to others; but this has no impact on the quality of education. If one were to ask a business leader to establish quality measures for the education graduates bring to their firms, I predict they would be related to the amount of knowledge the students bring and their ability to apply what they have learned. I predict as well that graduates, in time, upon entering the workforce would measure the quality of the education they received by their ability to retain and apply their knowledge in industry. Whether or not they enjoyed the face-to-face contact and personality of the instructors while getting an education is but a short-term goal, which in time, has little impact on their ability to succeed in the workforce. In fact, and in my opinion unfortunately, younger generations are relying less on face-to-face as the primary means of communication. Technology has drastically changed society, the way we communicate, the way we learn, and the way we work. As such, classrooms are becoming the new version of the horse and buggy. E-learning is becoming the hybrid vehicle.

Another element in the lean philosophy is customization. In order to meet customer needs, a high degree of customization is required. In the context of education, customization applies not only to the course objectives but also to the differences in learning styles. In order to meet these needs course material should be available in multiple formats. In order to eliminate waiting and transportation wastes, while still offering a high degree of customization, course content should be made available in both written form and in lecture videos. Again this material must be available for access at any time.

If the lean philosophy were to be utilized in academia, e-learning would be the primary learning environment. Perhaps, although not without flaw, e-learning can enable students to

Brian Leonard M.S.
Leonard Consulting and Training LLC
March 17, 2006

complete courses *when* needed. There are many benefits. Consider, for example, the student that must push graduation back an additional semester or an entire year simply because a required course is not offered when needed. In this case, is the customer getting exactly what they need, when they need it? However, if students were allowed to progress through courses at their own pace and all courses were available at all times via e-learning, not only would learning be improved, waiting time would be completely eliminated.

Such a transformation, as in any industry, will require that we rethink the very structures and procedures. However, under the lean philosophy, we must begin by allowing the customer to define quality and expectations. Currently, little attention is given to customer needs in the education system. Course content and expectations are not established at the customer level, which denotes an inherently flawed system from square one. Begin with the customer's perception of quality. Based on these perceptions, include only content, course material, and activities that add value to the aim of the course. Eliminate all forms of waste. The benefits, in theory, would be similar to that of lean systems in any service industry; a quality education in a much shorter time frame and lower cost.

¹ Deming, W. (1994) *The new economics for industry, government, education* 2nd Edition. Cambridge, MA: MIT.