

The Solomon EOS Electronic Blended Learning System (EBLS) for Lean Six Sigma

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Introduction

In the late 1980's and early 1990's the Lean Production System (LPS) methodology and the Six Sigma (SS) methodologies were deployed by leading organizations as foundational methodologies and philosophies for continuous improvement (CI). Training programs were developed to teach the methods and tools to employees across organizations. The results of deploying the Lean Production System methodology or the Six Sigma methodology resulted in significant improvements by organizations that successfully integrated one (or both) methodologies into their CI programs. Training programs emerged within organizations, consulting firms, and academia for Lean and Six Sigma, although many organizations saw them as competing methodologies. Most of the training programs recognized successful mastery of the methodology through a certification process. Certifications typically consisted of the completion of a training component and a project component. Master trainers combined in-class training and application of the methodology to realistic simulations and real projects. The learning was academic and experiential. Six Sigma training exploded claiming to be a win-win for the participant and the organization through the combination of training and implementation of continuous improvement projects that created significant benefits for the organization.

Typical Six Sigma Green Belt training required two one-week sessions spaced approximately one month apart to allow work of industry projects. The Six Sigma Black Belt training consisted of four weeks of training over a three month period. These programs are still available today from many institutions and consultants. On-line or E-learning training programs emerged to address the need to provide more flexible time offerings and to offer materials in a consistent manner to a large number of participants in many locations. These offerings often differed from the in-class programs in two dramatic ways: 1) individual on-line participants did not have an opportunity to interact and learn from other participants, and 2) the experienced trainer had little to no interaction with the participant.

Today, many types of continuous improvement training programs are available, including, Lean, Six Sigma, and Lean Six Sigma. These programs are offered in varying depth (yellow Belt, Green Belt, Black Belt), times (2 days to 18 days), in-class, and on-line. Consequently, the Body of Knowledge (BOK) for each course will vary based on the learning objectives and allotted training time. A typical Six Sigma Green Belt class will introduce some lean tools, but more emphasis will be placed on statistical data

analysis tools. A Lean Six Sigma Green Belt will include a balance between the Lean and data analysis tools in the BOK.

The students studying in Higher Education, individual professionals, professionals working within organizations and organizations sponsoring the training need efficient, effective, and affordable Lean Six Sigma learning that meets the following criteria:

- High quality academic Lean Six Sigma BOK materials
- Flexible training schedule
- Interaction with experienced professionals (Trainers and other participants)
- Realistic project experience
- Preparation to pass national and internationally recognized LSS certification exams.

In partnership with Solomon EOS, an **Electronic Blended Learning System (EBLS)** for Lean Six Sigma (LSS) has been developed to provide an efficient, effective, and affordable cost Lean Six Sigma training/certification program that meets national and international standards.

Solomon EOS Electronic Blended Learning System (EBLS) for Lean Six Sigma

Solomon EOS's Electronic Blended Learning System (EBL) for Lean Six Sigma is comprised of three core building blocks:

- Lean Six Sigma Content (BOK Modules),
- Professional Interaction,
- Electronic Interaction and Support

Solomon EOS EBLS for Lean Six Sigma Content (BOK Modules)

High quality academic content delivered in an easy to access and understandable format is one of the core requirements for the EBLS. The EBLS for Lean Six Sigma content is derived from the LSS BOK that has been established through best practices adopted by international organizations including American Society for Quality (ASQ), International Association for Six Sigma Certification (IASSC) and Society for Manufacturing Engineers (SME). Both ASQ and IASSC provide certification exams for Six Sigma (Green and Black Belt). SME provides Lean certifications (Bronze, Silver, and Gold). Ohio State University's Fisher College of Business conducted a study to establish Six Sigma Green and Black Belt standards for the BOK and certification. The OSU study included industry input for their members and Isixsigma.com users along with the ASQ BOK. The OSU study is considered the most comprehensive combination of academic and experiential requirements. ASQ has the reputation for being the standard for national and international quality certifications. Solomon's academic BOK content can be used in preparation for ASQ and IASSC certification exams. Achieved certification results have proven to be much higher utilizing the blended learning methodology of teaching. Students have certified at an **eighty-one per**

cent rate using the EBLS approach. This is a direct reflection of several advantages of the EBLS approach. The caliber of the on-line material is delivered in a highly interactive format. The flexibility of the student to receive the lessons without distractions enables the student to be more engaged. Additionally, the instructor has the ability to focus the “in class” portion on application of concept which engages students more readily.

Attachment 1 contains Solomon EOS’s BOK and learning objectives. The BOK is a true Lean Six Sigma BOK with a balance of Lean and Six Sigma content to reflect the need by participants to apply a combination of Lean and data analysis tools in the DMAIC format to solve Lean Sigma type projects. The content is divided into the Yellow Belt BOK and the Green Belt BOK. The Yellow Belt content provides an overview with foundational content for understanding the LSS Philosophy and applying LSS methodology to solve Lean Sigma process-based projects. The Green Belt content includes the Yellow Belt content.

Course content is arranged in electronic modules developed by The Quality Group (TQG). TQG is a leading developer of public and industry specific on-line Lean Six Sigma training programs. Solomon EOS has partnered with an established on-line provider with excellent academic materials developed by former IBM employees on an industry-hardened, user-friendly, and easy to access technology platform.

Solomon EOS also provides practical, industry-specific examples that participants can access to support primary academic modules.

Professional Interaction

Professional interaction is another EBLS core requirement. Many on-line programs can offer the academic content, but interpretation and application of academic theory to real situations can be overwhelming without experiential support. This is what the “Blended” component accomplishes in the Electronic Blended Learning system. Professional interaction happens in two dimensions in the EBL system.

The professional interaction is with the primary instructor and support subject matter instructors. The instructors’ role has several functions. These functions include:

- 1) Direct instruction during the electronic classroom training time,
- 2) Reinforcing/explaining E-Module academic content,
- 3) Conducting simulations/demonstrations to apply principles,
- 4) Providing experienced guidance to support industry specific questions, and
- 5) Provide guidance and review of Six Sigma projects.

The primary instructor interacts with participants in the E-Classroom through state-of-the-art electronic classroom media technology. Participants can ask questions during the classroom sessions.

The second dimension of professional interaction is between participants. It has always been our experience teaching public and custom LSS classes that the combined experience of the participants is greater than the lone experience of the instructor. Each participant brings their academic and experiential knowledge into the classroom. The EBL system enables the participants and the instructor to interact as if in a traditional classroom setting. Students can engage in discussions in the E-classroom and through team-based simulation and practice exercises between E-classroom sessions. The result is an exponential increase in academic and subject matter resources to solve real projects.

Electronic Interaction and Support

A third building block of the EBL System is the electronic interaction and support to facilitate the learning. As stated above, the academic content is electronically delivered to each participant in an industry-hardened, user-friendly, and easy to access technology platform developed by TQG. The classroom content is delivered electronically through technology platforms designed for distance education to facilitate instructor/participant interaction and learning. The technology supports real-time and virtual interactions. Cloud technology is used to enable teams to conduct experiments and share data as if in live team-based simulation.

Most LSS training programs utilize software in the training. Solomon EOS supports JMP[®], Minitab[®], or Excel[®]. State-of-the-art screen capture software is utilized to record demonstrations of software tools for 24/7 electronic access.

The Solomon EOS EBL system enables each participant the maximum flexibility to access academic modules, interact with the instructors and participants, and learn the LSS methodology and tools.

References

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About the Author

Through Dr. Clapp's 35+ years of academic research and industrial experience, he has developed and taught academic and industrial training courses for engineering design, advanced problems solving, new product development, quality process improvement and product design. Beginning in 2000, Dr. Clapp worked directly with Dr. Blanton Godfrey to develop Six Sigma training materials for Champion, Design for Six Sigma, Master Black Belt, Black Belt, Green Belt programs including over 1,000 presentation slides that have been integrated into a highly efficient learning approach for combining lecture, software usage, and hands-on teaching labs to make significant improvements to meet the organization's strategic objectives. The past two years he taught a wide variety of continuous improvement programs for industry through the NC Community College System. He has also developed and teaches a graduate-level on-line Six Sigma course through NC State's Engineering On-Line program. Over the past thirteen years, Dr. Clapp has instructed and coached professionals around the world in a wide variety of organizations, including service, manufacturing, automotive, healthcare, and research. He currently teaches a wide variety of workshops to improve manufacturing processes and support design of new products. From a research perspective, he has experienced all of types of training programs and evaluated the pros and cons of each type of training approach.

He has published over thirty papers and generated eleven patents that solve manufacturing challenges such as 1) an automated guided laser cutting system for cutting fabric, 2) systems for grasping and manipulating limp materials, and 3) sensor systems to monitor seam quality on-line. He has developed strategies for accelerating the development of customized commercial equipment for the small, specialized manufacturer.

He has a passion for developing and advancing Continuous Improvement methods and accelerating learning effectiveness and efficiency. Dr. Clapp currently serves as a Senior Associate with Solomon EOS to develop and teach the EBL System for Lean Six Sigma. Dr. Clapp is a member of ASQ.

