Deploying the LAI Lean Academy at Northeastern University

Hugh McManus, EdNet
2009 Lean Educator Conference
Lean Advancement Initiative (LAI): Formed in 1993

- Industry
  - Airframe, engine, avionics, missile and space companies
- Government
  - Air Force agencies, system program offices, and headquarters
  - Army, Navy
  - Department of Defense
- Academia
  - MIT - Schools of Engineering and Management

A national consortium for research, implementation and diffusion of lean practices
LAI Educational Network (EdNet)

- Formed in 2002 to catalyze development and deployment of Lean Thinking curriculum

**Vision:** EdNet is a *learning community dedicated to creating, deploying, and continuously improving curriculum for enterprise excellence; noticeably impacting workforce capability; and recognized as a model of collaborative innovation.*

**Mission:** EdNet will leverage member’s expertise and resources through collaboration and networking to accelerate the development and deployment of curriculum for achieving enterprise excellence.
The LAI Educational Network
April, 2009

AFIT
Anáhuac University, Puebla (MX)
AZ State U
Boise State
Cal Poly SLO
Central Community College (NE)
Cranfield (UK)
DAU
Embury-Riddle
Georgia Tech
Indiana State Univ
Indiana University School of Medicine (IUSM)
ITESM Monterrey (MX)
ITESM Zacatecas (MX)
Jacksonville Univ
Loyola College, MD
Loyola Marymount
Macon State Col
Missouri University of Science & Technology
MIT
Montana State
Old Dominion Univ
North Carolina State
Northeastern Univ
Purdue Univ
St. Louis Univ, MO
San Jose State Univ
Universidad Popular Autónoma del Estado de Puebla (MX)
U of AL, Huntsville
U of Iowa
U of Michigan
USC
U of Bath (UK)
U of LA, Lafayette
U of Salerno, (IT)
U of South Florida
U of Texas Pan American
U of Tenn, Knoxville
University of VA
Wichita State Univ
Wright State Univ
WPI

42 Member Schools

A 3-person EdNet Staff coordinates, develops, and delivers curriculum
Accelerating the transfer of knowledge into curriculum
LAI Lean Academy® Courses

**Curriculum**
- Lean Enterprise fundamentals
- Active learning pedagogy
- Concepts & real-life examples
- 3 and 5 day formats
- Before and after lean proficiency assessed
- Targeted audiences
  - Instructors
  - Undergraduate or graduate
  - Interns, co-ops
  - Lean newbies

**Strategy**
- Develop, deploy curriculum
- Jointly teach off-campus venues
- Diffuse to on-campus offerings
- Link academia with industry
- Develop faculty competency
Deployment of Lean Academy into University Curriculum

• Modules and Simulations incorporated into existing curriculum
  • University of Alabama, Huntsville - theme in several courses
  • University of Southern California - capstone sequence

• Modules and Simulations used as the basis for new courses
  • Embry-Riddle Aeronautical U. - Lean Engineering course
  • University of Louisiana Lafayette - Lean course

• Lean Academy given as special 3 or 4-day course
  • Massachusetts Inst. of Tech. - Aero. Engineering
  • University of Iowa - Business School (since customized extensively)

• Lean Academy implemented directly as 1-semester course
NEU MIM617 Lean Concepts

• Fall 08 Semester Elective in IE and ME
  • Prof. Sagar Kamarthi (NEU)
  • Dr. Hugh McManus (EdNet/Metis Design)
    Acting as and compensated as Lecturer at NEU
• 11 Students: 4th and 5th year seniors
  • Mostly Industrial Engineering (IE), few ME, 1 Business
  • Advanced process knowledge (IE more than Lean)
    = High but oddly distributed VALUE scores
• Straight Lean Academy Curriculum v6.2
  • Expedient - course given on effectively zero notice
  • Experiment - we have claimed this can work
• Weekly homework, midterm, final and term project with local companies added
Highest Student VALUE scores to date; odd distribution

- Industrial Engineering (IE) students had extensive process knowledge and basic lean exposure
- Terminology sometimes a barrier (IE ≠ Lean)
Instructor Observations

- Curriculum maps easily to semester class
  - 2 x 90 min classes a week
- Extra lecture time available (compared to 3-day class)
  - Extra time spent on discussion
  - Also depth in Value Stream Mapping, Lean Engineering
- Homework, midterm and final fairly easy to build from available materials
  - Learning objectives helpful
  - Still something of an art however; qualitative material
- Term project a good supplement
  - A practical application experience
  - Major time commitment for instructors and students

Homework, Quiz and Project Material available
Extra time very valuable

- Discussion and in-depth exploration of topics
  - Exploration of the relation between Lean and IE
- More time for active learning
  - Can run exercises to conclusion, hit all learning points
  - Sim Value Stream map, AP case future state highlights
Term Project

- Two local companies provided “basic lean” projects (food packing and faucet manu.)
  - Three + site visits
  - Process definition, VSM, lean tool analysis and A3 plans
  - Staff sensei mentoring, but student work
  - Final report, both presented and written

- Labor/time/effort intensive
  - Realistic real-world problems, tool exercises
  - Students did not enjoy real-world frustrations
Outcome

• **NEU student assessment**
  • 75th percentile of Mech. & IE classes overall
  • “outstanding” for a new class
  • Online materials (BOOK files) and “in class discussions and exercises” noted in particular - 90+ percentile
  • Challenge of materials, use of (numerical) tools weak points

• **Lean Academy assessment**
  • Highest student value scores to date, typical before/after delta
  • Feedback data collected at midterm and final
  • Lower numerical assessment than compact academies
  • Written feedback very positive on simulations and in-class exercises
  • Negative written feedback on project organization (mostly frustration), depth of materials (students wanted more), tours (students wanted to see “lean in action”)
Highs and Lows

Dick Lewis

“Failed” tour

Active Learning
Summary and Future Plans

- LAI Lean Academy deploys well as a one semester class
  - Homework, quiz, project templates make this near-turnkey
  - Best for new-to-lean students

- Next Year:
  - Repeat class
  - Replace/supplement on-site project with series of numerical analyses using IE tools
  - A step in the integration of Lean into “traditional” industrial engineering curriculum

LAI Lean Academy v. 6 available now!
Upcoming Events

LAI Lean Academy Course
July 13-15, 2009
(10% discount for LAI members)

LAI Lean Healthcare Academy
July 16-18, 2009
(10% discount for LAI members)

Knowledge Exchange Events
Network - Share - Learn

Sustaining Lean Practices Through Industry Education

Host:
Boeing,
Seal Beach, CA

lean.mit.edu - events

web.mit.edu/professional/short-programs/