

Where is the Evidence-Based Support for Lean Higher Education?

The Research, the Challenge, and the Opportunities

Lean HE Hub Conference

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Today's Goals

- Raise concern regarding the consequence of no/limited scientific support for the effectiveness of LHE
- Lead a discussion on the challenges and possible solutions
- Be provocative
- Move LHE from a pseudoscience to a science
 - *How's that for provocative?!*

Many Universities Implementing LHE

U Central Oklahoma

U New Orleans

U Michigan

U Iowa

U Scranton

Rensselaer Polytechnic

UC Berkeley

U Washington

U Minnesota

U Wisconsin

U Virginia

U Texas – Dallas

Carleton U

U Waterloo

U St. Andrews

Macquarie U

Miami U

Des Moines Area CC

Tarrant CC

Cardiff U

U Sheffield

U North Alabama

U Aberdeen

U Stirling

U Strathclyde

Edinburgh Napier U

St. Jerome's U

HAN U Applied Sciences

Wilfrid Laurier U

U Saskatchewan

U Notre Dame

Bowling Green State U... and more!

And Why Not?

- LSS: 60+ years of success
 - Success in virtually every industry (manufacturing) and service (health care)
 - Widely acknowledged even if not practiced
- LHE: \approx 20 years later
 - Great examples of success in HE
 - Growing list of HE institutions exploring LHE
 - LHE conferences and networks of support

The BIG Question:

Why aren't MANY more
universities and colleges
considering or
implementing LHE?

Hypotheses

- From 10+ years of experience as a professor, applied psychologist, LHE facilitator/advocate/consultant/speaker, and University Administrator:
 1. Failure to speak the language of HE
 2. Failure to communicate the language of LHE
 - 3. Failure to demonstrate the effectiveness of LHE**
 4. Failure to understand the dynamics of organizational transformation and change

Balzer, W.(June 2-3, 2014). Why is the broad implementation of Lean Higher Education failing? 2nd International Conference on LeanSixSigma for Higher Education. Arnhem, Netherlands

Failure to Demonstrate the Effectiveness of LHE

- What evidence do we have?
 - Case studies
 - Krehbiel & Balzer review (underway): NO “scientific” studies found in published LHE literature
 - Extrapolation from sectors outside HE
 - Balzer et al. 2009: published LSS are case studies
 - Books, articles, technical reports and presentations – all/most/many are not peer reviewed
 - Testimonials and anecdotes

Into the Looking Glass (or the eyes of a senior administrator)

- Does scientific thinking provide the necessary evidence to support LHE?

OR

- Do pseudoscientific claims offer conclusive “proof” to support LHE?

Science vs. Pseudoscience

Scientific Thinking Principles

- Have important alternative explanations for the findings been excluded?
- Can we be sure that A causes B?
- Can the claim be disproved?
- Can the results be duplicated in other studies?
- Is the evidence as convincing as the claim?
- Does a simpler explanation fit the data just as well?

Signs of Pseudoscience

- Exaggerated claims?
- Overreliance on anecdotes?
- Absence of connectivity to other research?
- Lack of review or duplication by other scholars?
- Self-correction when contrary evidence is published?
- Use of fancy scientific sounding but meaningless terms that don't make sense?

Science vs. Pseudoscience

Scientific Thinking Principles

Warning Signs: Pseudoscience

RULING
The scientific method is a process of testing a hypothesis to determine if it is supported by evidence. It involves making observations, forming a hypothesis, testing the hypothesis, and drawing conclusions based on the results.

CORRELATE
Correlation does not imply causation. Just because two things happen together does not mean one causes the other. Scientists look for causal relationships through controlled experiments.

REPLICATE
Scientific findings should be replicable. Other researchers should be able to repeat the experiment and get similar results. This helps to confirm the validity of the findings.

OCCAM'S
Occam's razor suggests that the simplest explanation is usually the correct one. Scientists prefer theories that make the fewest assumptions.

REPLICATE
Scientific findings should be replicable. Other researchers should be able to repeat the experiment and get similar results. This helps to confirm the validity of the findings.

No peer review
Pseudoscience often lacks peer review, a process where other experts in the field evaluate the work before it is published.

No testable hypothesis
Pseudoscience often makes claims that are not testable or falsifiable, making them impossible to disprove.

No falsifiability
A key feature of science is that hypotheses can be proven wrong. Pseudoscience often avoids falsifiability by using vague or untestable claims.

No replication
Pseudoscience often fails to provide replicable results, with different studies or practitioners getting different outcomes.

No scientific consensus
Pseudoscience often lacks support from the scientific community, which has established standards for evidence and methodology.

Think about it.....

- Would you drive over a suspension bridge that wasn't designed based on science?
- Would you fly (home from this conference) on a plane that wasn't designed based on science?
- Would you allow your child to receive a medical treatment for a serious medical condition that wasn't based on science?
- **Would you adopt an LHE management strategy and philosophy that wasn't based on science?**

“Valid” Evidence in Real World Settings: The Best Approximation of Truth

Type of Validity	What you want to confirm/falsify?
Statistical Conclusion Validity	Are the presumed independent and dependent variables related ?
Internal Validity	Is there a causal relationship between the independent and dependent variables?
Construct Validity of Causes or Effects	Are we measuring what we think we are measuring?
External Validity	Can we generalize the causal relationship across persons, settings, and times?

Valid Evidence and LHE: Some Examples

Type of Validity	What you want to confirm/falsify?
Statistical Conclusion Validity	Can we demonstrate a statistical relation between LHE intervention and outcome(s)?
Internal Validity	Are we sure it is the LHE intervention that caused the outcome(s) to change?
Construct Validity of Causes or Effects	Do measures of “LHE intervention” and “Outcome(s)” refer to the same thing for all LHE practitioners?
External Validity	If LHE worked for hiring process at University A in 2015, will it generalize to other functions, institutions, and points in time?

Establishing Valid Evidence for LHE

(that can be shared with senior HE administrators!)

1. Better research designs for LHE projects
2. Statistical tests to confirm a real relationship between the LHE intervention and outcome(s)
3. Better descriptions of LHE interventions and better (and more) measures of outcomes
4. Replication of LHE project findings

Without Valid Evidence, what can we really say?

- If LHE team members self-select to participate, maybe they are really different from other employees?
- Would any intervention have worked equally as well as LHE?
 - Maybe if we just told the supervisor to fix the process we would have seen the same outcomes.
- Is the improvement in outcomes a real improvement or maybe due to chance?
- Can you be sure if we do the same LHE intervention again we will get highly similar results?
- I see that we reduced the number of steps and time in the process. But how do we know whether the students who use the process are happier, and the employees who deliver the process feel more engaged and satisfied?
 - And how do the supervisors who used to have responsibility for changing the process feel?
- How do we know the benefits from the LHE intervention will remain?
 - Will there be backsliding, or will it all come to a halt when there is a new facilitator, manager, VP or President?

Opportunities for Establishing Valid Evidence that LHE Works

Areas of Opportunity

1. Better research designs for LHE projects
2. Statistical tests to confirm a real relationship between the LHE intervention and outcome(s)
3. Better descriptions of LHE interventions and better (and more) measures of outcomes
4. Replication of LHE project findings

1. Better research designs for LHE projects

Expand from: LHE  OUTCOME

to:

OUTCOME₁  **LHE**  **OUTCOME₂**

or:

LHE  **OUTCOME**_{LHE TEAM/PROCESS}

ANYTHING  **OUTCOME**_{OTHER TEAM/PROCESS}

(CONT'D) 1. Better research designs for LHE projects

or:

LHE_{PROJECT#1}  **OUTCOME**_{LHE TEAMa/PROCESS#1}



LHE_{PROJECT#1}  **OUTCOME**_{LHE TEAMb/PROCESS#1}



LHE_{PROJECT#1}  **OUTCOME**_{LHE TEAMc/PROCESS#1}



LHE_{PROJECT#1}  **OUTCOME**_{LHE TEAMd/PROCESS#1}

(CONT'D) 1. Better research designs for LHE projects

or:

OUTCOME₁ → LHE_A → OUTCOME₂

OUTCOME₁ → OUTCOME₂ → LHE_B → OUTCOME₃

OUTCOME₂ → OUTCOME₃ → LHE_C →
OUTCOME₄

Timeline:

January → February → March → April → May → June → July → August → September →

(CONT'D) 1. Better research designs for LHE projects

or:



2. Statistical tests to confirm a real relationship between the LHE intervention and outcome(s)

- Use of accepted tests of statistical significance
 - t test, correlation, multiple regression, etc.
 - Minitab, SPSS, SAS, etc.
- Large number of observations needed for “powerful” tests of statistical significance
 - Use “within participant” research designs
 - Take multiple measurements
 - Combine across studies (and test for interactions)
- Partner with a statistician



3. Better descriptions of LHE interventions & better/more measures of outcomes

- Clearly identify differences in LHE interventions
 - Medical Metaphor: Different medicines, different doses, different combinations of medicines/doses
- Add appropriate measures based on models and theory
 - Impact on process, institutional effectiveness, beneficiaries/stakeholders (student, employee, etc.)

(CONTD) 3. Better descriptions of LHE interventions
& better/more measures of outcomes

- Lawrence, H. & Cairns, N.J. (2015). *A Guide to Evidencing the Benefits of Business Process Improvement in Higher Education*. Section C1. <http://ewds.strath.ac.uk/evidencingbenefits>
- Brook, Q. (2010). *Lean Six Sigma & Minitab: The Complete Toolbox Guide for All Lean Six Sigma Practitioners*. OPEX Resources, Ltd.
- Harrington, R. (1987). *Poor-Quality Cost*. New York: Marcel Dekker Inc./ASQC Quality Press.

(CONTD) **3. Better descriptions of LHE interventions
& better/more measures of outcomes**
Examples: Lawrence & Cairns (2015)

Category	Measurable Benefit	Key Measurement Or Analysis Tool	Suggested Measurement
Quality	Reduction in waste	Performance Measures	Baseline vs. post-improvement % increase: # process steps complete and accurate
Operational Delivery	Overall length of end to end process	Lead Timing Sheet	Improved lead time (%)
Staff Engagement	Improved morale of team	Survey	Baseline vs. post-improvement: morale levels
Financial	Reduced costs/expenditures	Financial Reports	Cost savings on IT/ Furniture/Reused items

4. Replication of LHE project findings

- Conduct rigorous LHE research and disseminate (failures too!) with enough detail to replicate
 - Replicate within institution
 - Replicate across institutions
- Inter- institutional collaboration on original research design, LHE implementation, outcomes, and analyses
- Meta-analyses collapsing across independently conducted rigorous studies
- “Systematic Review” and evidence synthesis
 - Rousseau (2012) “Evidence-Based Management”

General Recommendations: From Pseudoscience Science

- Strength in Numbers: Collaborating to gather evidence for LHE effectiveness
 - My strengths compliment your strengths
 - Collaboratively design and/or share standard measures
- Draw on the Expertise of Others
 - Engage methodologists and statisticians before conducting the LHE project
- LHE Research/Practice Consortium:
 - Common data base for LHE studies
 - Repository of research studies
 - Library of “gold standard” measures
- Professional development for current and aspiring LHE practitioners

Summary

- Focus: One hypothesis why universities are not implementing LHE
 - **Failure to demonstrate the effectiveness of LHE**
- Provoke greater self-reflection on our efforts
 - **Pseudoscience (testimonials, case studies, faith) is not enough**
- Suggest ways we can establish valid evidence that LHE works
- Recommend how the LHE community can collaborate to advance the science – and broaden the practice - of LHE

References

- Balzer, W., Brodke, M., & Kizhakethalackal, E. (*in press*) Lean higher education: Successes, challenges, and realizing potential. *International Journal of Quality and Reliability Management*.
- Balzer, W.K., Smith, E., & Alexander, K. (April, 2009). *What do we know about the psychology of Lean?* Presentation at the 23rd Annual Conference of the Society for Industrial and Organizational Psychology, New Orleans, LA.
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- Harrington, R. (1987). *Poor-Quality Cost*. New York: Marcel Dekker Inc./ASQC Quality Press.
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- Rousseau, D. (2012). *The Oxford Handbook of Evidence-Based Management*. UK: Oxford University Press.
- <http://www.slideshare.net/rodsazon/threats-to-internal-and-external-validity>

- A worksheet to help you do this
- Isn't a four step plan better than a 12 step program?

Thanks!

Questions & Advice