



## Workshops for the Engineering Faculty Engagement in Learning Through Service (EFELTS) Project: Development and Initial Findings

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# **Workshops for the Engineering Faculty Engagement in Learning Through Service (EFELTS) Project: Development and Implementation**

## **Abstract**

The EFELTS project consists of a three-year effort focused on Learning Through Service (LTS) – a pedagogical method that combines academic learning with service. These educational efforts can range from curricular service-learning to extracurricular community engagement efforts; each enhancing the educational experience for engineering students. The EFELTS project involves a team of investigators from five, diverse institutions invoking a 4D Process (Discover, Distill, Design, and Disseminate) to realize two project goals: a) evaluate the impacts on engineering faculty currently engaged in LTS efforts; and b) empower and aid faculty to implement new, or enhance existing, LTS efforts. This paper focuses on the Design component of the process, specifically the development and implementation of a series of faculty workshops on LTS efforts and faculty views on LTS in engineering education.

The EFELTS project team developed and conducted two, 2-day workshops for engineering faculty involved with new or existing LTS efforts at their institutions. A total of 36 participants from various academic institutions and with various employment levels attended workshops in Houghton, MI (August 2012) and Boulder, CO (September 2012). Workshop participant selection was partially based on the LTS activity that they proposed to implement/enhance at their institution. Workshop design consisted of three connected components – 1) LTS grounding, 2) preliminary development of an LTS effort, and 3) exploring future options for a national LTS community. Exercises used in the grounding component explored participant's knowledge of LTS and their existing experiences and/or beliefs on the relevance of LTS to engineering education. The preliminary LTS development component, which encompassed the majority of the workshop's effort, focused on preliminary development and/or enhancement of participants' LTS efforts. This development effort was facilitated by the creation of an LTS 'blueprint' that provided a framework through which to structure LTS efforts. Finally, the workshop explored ways to build a 'community-of-practice' to help support the continued development and use of LTS in engineering education.

Formative and summative workshop evaluations, including qualitative and Likert-type quantitative questions, were administered to gauge participant satisfaction with specific workshop content and exercises. In summary, workshop participants had a high level of overall satisfaction with the workshop. Most participants commented favorably on the use of the LTS 'blueprint' as a framework to 1) structure their LTS efforts and 2) provide a methodology to continually review and enhance desired goals and values that their LTS effort intends to provide. In addition, participants became keenly aware of the need for appropriate assessment of LTS efforts to aid in the continuous enhancement of LTS, as well as to provide evidence of the benefits/costs associated with the use of LTS in engineering education. Specific results from LTS grounding exercises indicated that major benefits to LTS exist for all stakeholders including: 1) positive development of students' technical and professional skills, 2) real-world application of engineering concepts, and 3) numerous possible benefits to community and institutional stakeholders. These exercises also revealed that LTS can negatively burden available faculty time and may require additional financial and human resources. Suggestions for future efforts in creating a 'community of practice' of LTS practitioners include developing additional

workshops, modules, and other learning tools to further disseminate workshop and EFELTS goals. The development of a web portal through which LTS practitioners in engineering education, whether experts or novice, can share experiences was also suggested.

## **Introduction**

The EFELTS project is a three-year, NSF-funded effort that focuses on Learning Through Service (LTS) – pedagogical methods that combine academic learning with service. Such efforts can range from curricular service-learning to extracurricular community engagement efforts; each focused on enhancing educational experiences provided to engineering students. The EFELTS project has been described previously<sup>25</sup>. This paper focuses on the development and implementation of a series of faculty workshops on LTS efforts and faculty views on LTS in engineering education.

During the summer of 2012, two, 2-day workshops were developed and conducted in conducted at two locations; Houghton, MI and Boulder, CO. These workshops involved a total of 36 workshop participants involved with new or existing LTS efforts. Participants were employed in professoriate to staff positions at various academic institutions across the United States.

Workshop design consisted of three connected components – 1) LTS grounding, 2) preliminary development of an LTS effort, and 3) exploring future options for an LTS community. Exercises used in the grounding component explored all participants’ knowledge, existing experiences and/or beliefs, and relevance of LTS in engineering education. The preliminary LTS development component, which encompassed the majority of the workshop’s effort, focused on preliminary development and/or enhancement of participants’ LTS efforts. This development effort was facilitated by the creation of an LTS ‘blueprint’ which provided a framework from which to structure LTS efforts. Finally, the workshop explored ways to build a ‘community-of-practice’ to help support the continued development and use of LTS in engineering education.

## **Background on Workshop**

These workshops arose from a number of reports and resources that focus on how engineering students are educated and/or how engineering is presented/taught to prospective students. For example, engineering education has traditionally focused on developing students’ technical skills, but many national organizations have suggested that technical expertise alone are no longer sufficient.<sup>1,3,4,16</sup> The need for a “paradigm shift” has been recognized and Learning Through Service (LTS) holds promise in meeting many of the higher expectations of engineering education. Evidence exists that service-based education has a strong level of acceptance by many students<sup>6, 15, 21</sup>. Therefore, a true need to realize this paradigm shift is to prepare engineering *faculty* to deliver such forms of education.

Faculty development in LTS must be based on foundational research that considers LTS as an effective learning strategy. Previous research has found that when project-based learning merges with service efforts, there is potential for student development on cognitive<sup>8, 9, 14, 18, 20</sup>, social<sup>10, 11, 22, 23</sup>, and moral<sup>7, 15</sup> levels. These theoretical constructs may spawn learner development on these multiple levels, ultimately leading to maturation, heightened self-awareness, and greater cognitive development. Though this previous, foundational research has been predominantly

done in disciplines of education, psychology, and social science, engineering student have shown considerable interest in curricular and extracurricular LTS efforts. This interest has created institutional momentum for integrating the approach within engineering curricula – including efforts in first-year projects, core engineering science, and senior design courses.<sup>5, 12, 17, 19, 21</sup>

However, numerous challenges with LTS projects have been identified<sup>2, 6, 13</sup> including: 1) a need for the project purpose to align with program outcomes; 2) a meaningful relationship with the community; 3) a project planning phase; 4) site visits; and 5) a number of implementation challenges including regulations, liability, local constraints, and sustainability. The focus of the EFELTS project is to evaluate LTS's positive attributes and challenges as they relate to engineering faculty. The EFELTS workshops were an attempt to not only bring these characteristics of LTS to the fore, but to also highlight the need for proper design, management, and assessment of LTS efforts; in a method appropriate for both novice and experienced faculty.

## **Goals and Aims**

In addition to workshops, the EFELTS project consists of three other major components – a September 2011 summit of faculty experienced with LTS, an on-line survey, and interviews of faculty. Initial development of workshop components began with the results of the 2011 summit of LTS-experienced faculty where LTS efforts were more clearly defined and described and issues related to LTS implementation were reviewed and summarized<sup>25</sup>. Based on this summit and previous experience in similar workshops, the EFELTS workshops were developed with three critical goals in mind.

1. Clearly define LTS with the recognition that while LTS efforts may take a variety of forms, they all have a common point – service and learning outcomes are intertwined.
2. Provide protocols and methods for the successful implementation of LTS through the elements of design, management, and assessment.
3. Thrive to initiate development of a “community-of- learner” focused on LTS in engineering education.

Based on these goals, the overall aim of the workshop would be to have participants develop or strengthen an LTS effort that they would be involved with at their home institution. Therefore, for each participant, the workshop would provide a specific item on which the elements of LTS implementation (i.e., design, management, and assessment) could focus.

## **Workshop Design and Implementation**

The EFELTS workshops consisted of three distinct phases: 1) obtaining workshop participants, 2) implementing the workshop (including the pre- and immediate post-workshop efforts by the participants) and 3) providing opportunities for post-workshop impacts, status updates, and reporting. The following sections focus on the results of the first two phases of the EFELTS workshop effort. The third phase is on-going and will be briefly noted.

### Workshop Participants

The first phase of the workshop implementation was obtaining appropriate participants. During the spring of 2012, an open-call-for-participates was broadly disseminated through various

electronic mailing lists, personal contacts of the project PI's, and other education-based listservs such as department chairs/heads and ASEE Division member lists. Interested participants were required to submit a two-part application that requested a description of their proposed LTS effort and their expectation of the workshop (Part 1) and a letter of support from a department chair or dean (Part 2). Once collected, applications were reviewed by members of the EFELTS project team and placed into the various workshop locations. Note: Originally proposed as three workshops, with 12 participants each, to occur in different regions of the US, EFELTS project leaders recognized greater efficiencies could be realized if only two workshops were conducted, though with more participants per location. Therefore, two workshop sites were instituted – one each in Houghton, MI (August 9 and 10, 2012 with 16 participants) and Boulder, CO (September 14 and 15, 2012 with 20 participants). Participant travel and housing arrangements were supported by funds from the EFELTS project.

### Workshop Design

#### Pre-Workshop Efforts

Once selected, workshop participants were asked to perform specific tasks prior to attending their workshop. These tasks included 1) readings on LTS - its theory and application in engineering education; 2) completion of a short survey on their expectations of the workshop; and 3) completion of the on-line LTS survey, another part of the overall EFELTS project. Pre-workshop readings provided participants a scholarly background on LTS via a few articles that on LTS background and theory. The pre-workshop evaluation survey asked participants to comment on what motivates them to participate in LTS, how might their proposed programs be improved, and what they expected to gain from workshop participation.

#### Workshop Effort

The 2-day workshop was designed to address the previously noted goals of the workshop – characterize LTS, provide a framework for LTS design/management/assessment, and initiate development of a LTS community. Though the Houghton and Boulder workshop had differences, each followed the general outline presented in Table 1.

### Workshop Template – The LTS blueprint

The guiding element of the workshops was the LTS blueprint – a poster-like framework that divided the LTS development process into nine, connected sections. The blueprint, illustrated in Figure 1, should not be considered as nine separate sections, but as an iterative process that integrates the sections into a cohesive LTS effort. Brief descriptions of the nine sections are provided below.

1. Stakeholders – This section focuses on for whom you are creating value in your LTS effort. Example stakeholders include students, community members, colleagues, alumni, and administrators.
2. Value Proposition – This section focuses on the values (problem solved, service provided, etc.) that you plan to deliver to each stakeholder. This includes stating/evaluating the problems you are helping to solve, the products/services you are offering each stakeholder, and the needs you are satisfying.

**Table 1 – Typical Outline of Houghton and Boulder Workshops**

<b>Topic</b>	<b>Brief Description</b>
<b>Day One</b>	
<b>Characterization of LTS</b>	
Motivation	Explored the motivation of faculty to engage in LTS efforts.
Understanding LTS	Provided participants a common reference for definitions and background of LTS. Also highlight previous scholarship related to LTS.
Value of LTS	Explored, in general terms, the value (benefits, impacts, etc.) of an LTS effort. Focus was to participants as well as other involved stakeholders; e.g., students, institutions, community partners, resource partner, etc.
Understanding the Impacts	Further examined the who, what, and when of LTS impacts on stakeholders and other LTS participants
<b>LTS Design</b>	
Value by Design	Initiated the design process of the participants' LTS effort.
Design Framework	Introduced the LTS blueprint (Figure 1), then connected participants' specific efforts to the blue print design methodology.
Resources	Explored the additional resources that exist to further develop participants' designs
<b>Day Two</b>	
Inspiration from "other" voices	Presentations of views by non-faculty stakeholders; e.g., student and/or community partners, on impacts of LTS to them
<b>LTS Management</b>	
Opportunities	Explored opportunities and pitfalls in the management of LTS efforts. Related these to participants' efforts.
Sustainability	Discussed how to sustain LTS efforts so that they transform to a program.
<b>LTS Assessment</b>	
Of Stakeholders	Explored the value of assessment and the assessment 'space' – what are the impacts of effort on people
Of Program	Explore impacts of program on/to others
<b>LTS Community</b>	
Community of Learners	Explored ways to build a community of LTS practitioners and scholars
<b>Workshop close</b>	

3. Relationships – Description of the type(s) of relationship you have each of your stakeholders and what the expectations are to maintain this relationship are the focus of this section. This includes evaluating how critical, integrated, and costly such relationships will be to your effort.
4. Channels – This section focuses on the ways in which you and your stakeholders will communicate. Possible pathways include email, surveys, meetings, and web-based social media.
5. Key Activities – In this section, the activities of the LTS effort are formulated. How these activities are connected to the stakeholders and relationships noted above previously. Example activities include information sessions, research initiatives, and public symposium.
6. Resources – The key resources needed to attain the stated value propositions are evaluated. Example resources include physical resources like equipment, information resources like GPS data, human resources like a village elder, and financial resources.
7. Partnerships – This section focuses on the key partners you may need in implementing, managing, or assessing your LTS effort. These partnerships may include entities different from the stakeholders that are impacted by the LTS experience. Such partnerships may help with the fundraising, marketing, and assessment/evaluation processes.
8. Value Streams: Returns – This section focuses on what value(s) your stakeholders are willing to "pay". This payment may include monetary as well as contributions in other forms. This section also addresses how these returns contribute to the overall success of the LTS effort. Examples include supporter donations, scholarly publications by faculty, media coverage to promote program as well as the professional development for students and health benefits for community.
9. Value Streams: Costs and Outlays – In this section, the key and important costs that need to be accounted for are listed for the LTS effort. These costs may include items such as fixed costs (e.g., tuition), variable costs (e.g., time, energy, enthusiasm, etc.), and economies of scale and scope.

During the workshop, each participant developed an initial LTS blueprint which they took back to their home institution to continue to develop their LTS effort.

## **Workshop Assessment Results**

### Assessment Instruments

During the workshop, participants assessed the workshop's effectiveness by both formative (end of Day One) and summative (end of Day Two) instruments. These later two instruments consisted of Likert-style as well as open-ended questions.

Results from both the formative and summative workshop assessments indicate a strongly positive response from workshop participants. For example, Table 2 presents results from the summative assessment instrument given at the workshop at Houghton, MI on the workshop.





**Table 2 Summative Results from Houghton Workshop**

<b>Workshop Elements</b>	<b>Overall Rating from Poor (=1) to Excellent (=4)</b>
Pre-Workshop Homework	2.93
Day 1 Morning: Background sessions (motivation, understand, value)	3.20
Day 1 Afternoon: Design sessions (framework, timing, and resources)	3.13
Day 2 Morning: Management sessions (failure, opportunities, and sustainability)	3.60
Day 2 Afternoon: Assessment sessions (internal and external)	3.53
Day 2 Afternoon: Community Building	3.43

**Post-Workshop Efforts**

At this time, post-workshop efforts continue to occur, and thus, results are not presently available. Three specific elements of post-workshop effort include: 1) an interview of workshop participants soon after workshop completion; 2) completion of a short survey 6 months after workshop participation; and 3) participation in a special session at a future ASEE annual conference. The post-workshop interviews are being conducted as part of the interview protocol used in the overall EFELTS project. These interviews were recently completed and are currently being analyzed. The 6-month, post workshop survey has just been implemented. A special session at the 2013 ASEE annual conference is planned.

It should be noted that an overall EFELTS project goal is to develop a “community-of-learners’ for LTS design, management, and implementation. The 36 workshop participants, now provided with a channel to seek (and provide) continued support on their on-going LTS experience, represent a foundational group from which to develop such a community. Therefore, a post-work emphasis will be on the continued stewardship of the participant’s proposed LTS efforts.

**Summary, Conclusions, Future Directions**

Based on the success of the EFELTS workshops, it is hoped that additional workshops will be supported and planned. However, post-workshop efforts need to continue so to evaluate if the impacts the workshop has led to sustainable LTS efforts by engineering faculty.

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