Abstract

Multi-disciplinary programs are growing, and serve an integral role in fostering knowledge transfer among disciplines and the community. Despite their importance, relatively little has been written on how to foster success in multi-disciplinary higher education engagement initiatives, particularly in ways that encompass service-learning. The current work highlights unique multi-disciplinary needs for knowledge transfer, critical and creative thinking, and building bridges between academia and practice. The SOLL model, a sustainable, integrative framework that encompasses lecture, operative, and service-learning, is summarized as one way in which to meet such multi-disciplinary needs. The current work discusses two applications of this model in graduate and undergraduate consumer science engagement initiatives.

Fostering student credibility through sustainable engagement initiatives: An application of the Service, Operative, and Lecture-Learning (SOLL) Model

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> "Principles for the Development of a Complete Mind: Study the science of art. Study the art of science. Develop your senses- especially learn how to see. Realize that everything connects to everything else."
> — Leonardo da Vinci

Introduction

The academic world is changing in such a way that multi-disciplinary initiatives in teaching, research, and engagement are being facilitated. For example, there are now multi-disciplinary programs in cognitive science, women's studies, and environmental studies to name a few. As an exemplar program, the consumer sciences are also multi-disciplinary, including areas such as community development, consumer behavior, economics, family studies, finance, hospitality, retailing, textiles, and psychology. This non-exhaustive list of consumer science disciplines highlights the breadth of education that students in such a multi-disciplinary program typically receive. Not only are programs such as these multidisciplinary in terms of academic content, but they also require students to develop the applied skills to succeed outside of the classroom.

Despite many papers being written regarding academics and application within discrete disciplines, many such needs for multi-disciplinary programs are unique and under-recognized. For example, a primary challenge in multi-disciplinary programs is providing students from extraordinarily varied backgrounds with the academic content knowledge required for credibility in a multi-disciplinary field, in addition to hands-on applied experience for credibility within the community. Credibility is paramount when considering the qualities of a multi-disciplinary student. Credibility is

comprised of expertise and trustworthiness (Hovland, Janis, & Kelley, 1953). Thus, an exemplar multi-disciplinary student would be an expert in their knowledge and skills related their specific discipline area. Additionally, an exemplar multi-disciplinary individual would have at least tangential understanding of the other areas related to their area of expertise, demonstrating the strength of multi-disciplinary perspectives. The second component of credibility cannot be overlooked: trustworthiness. Multi-disciplinary individuals must demonstrate evidence-based knowledge and skills that are reliable and sound. If these two credibility components are missing, engagements between students and community (including industry) could lead to negative outcomes.

This paper provides an overview of the theoretical rationale underlying the Service, Operative, and Lecture-Learning (SOLL) Model (Norris, 2014) which has been suggested as a rigorous way of facilitating student credibility through experiential learning within higher education (Norris, 2014), with potential points of translation for business (Norris and Carter-Rogers, In Press). Importantly, this paper goes beyond previous publications by providing two concrete examples of how SOLL has been applied within a multi-disciplinary higher education program at both graduate and undergraduate levels. Application successes and lessons learned are discussed.

Fundamental to the SOLL model is the idea that in order to develop student credibility within a multi-disciplinary program, unique curriculum should be explicitly recognized. Specifically, there is a need for multi-disciplinary programs to 1) foster multidisciplinary knowledge transfer in both theory and practice, 2) integrate creative and critical thinking in both theory and practice, and 3) build bridges between academe and practice.

1. Fostering Knowledge-Transfer in a Multi-Disciplinary Program:

In order to be credible in multi-disciplinary academics or industry, an individual must have comprehensive and integrative multi-disciplinary training. For example, in order to be successful in community pro-health messaging, a student must know what makes a compelling campaign (psychology, marketing), must understand budgeting (finance), and must have an understanding of impact from a given campaign (economics). In addition to integrated knowledge of many areas, students in community pro-health messaging also must have creativity, demonstrating skills in areas such as design. Having a broad course load to develop comprehensive and integrated knowledge is not a challenge in and of itself, but facilitating multi-disciplinary knowledge and skill transfer among content areas requires active instructor participation in curriculum goals and development. Specifically, faculty must engage in inter-departmental discussions of curriculum goals, and design lecture material and assignments that require integration between prerequisite knowledge and current content. This can be a time-consuming and effortful process.

2. Integration between Creative and Critical Thinking:

Critical thinking is a hot topic in higher education. Although the concept of critical thinking is often discussed as one general ability, the nature of critical

thinking is actually quite complex (e.g., Kennedy, Fisher, & Ennis, 1991). For example, Facione worked with the American Philosophical Association and defined critical thinking to be “purposeful, self-regulatory judgment which results in interpretation, analysis, evaluation, and inference as well as explanation of the evidential, conceptual, methodological, criteriological, or contextual considerations upon which judgment is based” (1990).

Based on such work, it seems that critical thinking is *not* creative (Kennedy et al., 1991). Although it is now recognized that creative and critical thinking should be integrated (Beghetto & Kaufman, 2010; Sternberg, 2010; Tsai, 2012), the initial lack of integration between creative and critical thinking has resulted in an implicit tension, particularly when a multi-disciplinary area contains both arts and science components. In such disciplines, some students and faculty may desire and demonstrate strong creativity skills, whereas others rely heavily on linear, critical thinking. There is a clear need for a formal strategy in post-secondary multi-disciplinary programs to develop and integrate complementary critical and creative thinking skills.

3. Building the Bridge between Academe and Practice:

A third challenge in multi-disciplinary programs is the seeming lack of teaching how to translate knowledge between academia and practice. Often, academics are considered in an ivory tower with little understanding of “the real world.” Although this lack of bridge has been addressed in terms of research (e.g., Wallerstein & Duran, 2010), there appears to be a dearth of literature addressing how to teach students to build such bridges. Furthermore, bridge building must be taught with care, fostering a sense of responsibility on behalf of students. A poor interaction could lead to negative outcomes for organizations and a failed learning opportunity for students.

Developing Faculty and Student Credibility in a Multi-Disciplinary Program through Engagement:

In order to meet multi-disciplinary needs, curriculum must foster multi-disciplinary knowledge transfer, creative and critical thinking, and build trustworthy bridges between academia and the community. To ensure credibility, curriculum should address these needs in a multi-level approach that matches the needs of a multi-disciplinary program. The current work overviews and provides examples of a framework to assist faculty in reaching these program outcomes. This model specifically demonstrates a way to incorporate traditional lecture based learning, operative skills-based learning, and service-learning at both the undergraduate and graduate level.

An Overview of the SOLL Model

Many models exist to account for learning, and it is not the intention of this model to account for *how* learning occurs. Rather, the Service, Operative, and Lecture Learning (SOLL) Model is a multi-method of curriculum development that fosters credibility through knowledge transfer, creative and critical thinking, and bridge building across three dimensions: the content dimension (lecture-based

learning), the skill creation and development dimension (operational learning), and the application/evaluation (service-learning) dimension (Norris, 2014).

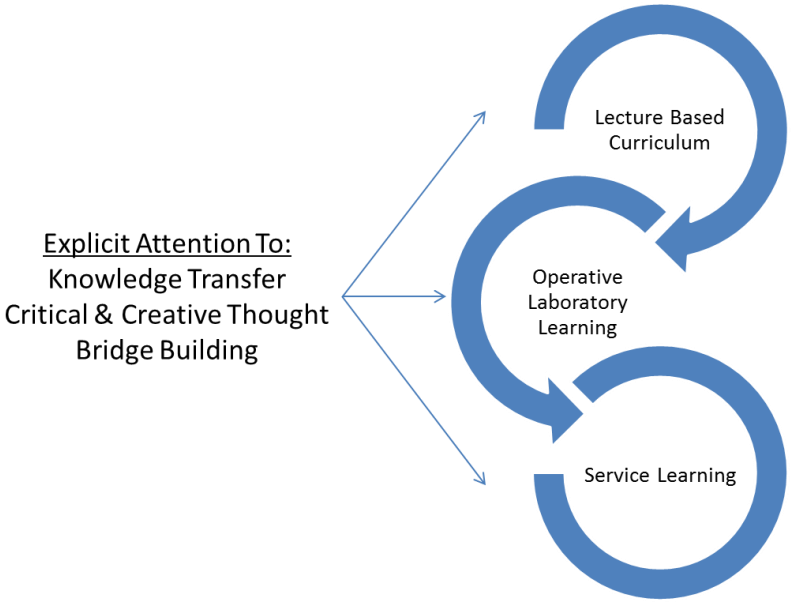

Figure 1. The SOLL framework for developing multi-disciplinary curriculum (Norris, 2014)

Lecture-Based Learning: Lectures remain the primary teaching method used in universities (Edwards, Smith, & Webb, 2001). Although lectures may risk lacking interaction and engagement (e.g., Black, 2005; Kozma, Belle, & Williams, 1978), they do have positive aspects: good lectures have been shown to inspire (Edwards et al., 2001), promote student consideration of provocative ideas and current events (Donicar, 2005), and lectures provide students with an opportunity to have assistance navigating complex scholarly issues (Laing, 1968). The contention of this model is *not* that university lectures should be avoided, but rather traditional lecture formats should be supplemented with additional forms of learning, ideally within the same course for maximum student engagement with the content.

Lectures provide an ideal opportunity to begin facilitating knowledge transfer among related disciplines. They allow for discussion of case studies, video presentation of complex scenarios, and the instructor can explicitly probe both creative and critical thought by referring to content from related disciplines. The foundations for connections among academia and the community can be made through making connections between community challenges and course material.

Operational Learning: Operational, or functional, learning focuses on students developing and refining the specific processes and skills needed to achieve a certain outcome. This type of learning would be most easily fostered in a lab setting where students can engage in hands-on or simulated experience of a given concept.

Despite the intuitive necessity for quality laboratory assignments, research suggests that many labs fail to achieve their goals. Specifically, professors are spending time and effort in managerial tasks rather than probing and challenging student thoughts and skills (Hofstein & Lunetta, 2003). Additionally, as Hofstein & Lunetta demonstrate, most lab assessments, at least in scientific domains, focus on paper-and-pencil assessments rather than practical skills obtained. Applications of the current model probe and challenge student thoughts and skills while minimizing administrative time, and stressing the importance of skill creation, development, execution, and refinement.

Like lectures, operational learning contexts provide opportunities for comprehensive learning, albeit in a skills-based context. Knowledge transfer can occur through operational learning by creating assignments that require integration of content and skills across disciplines. For example, a mass-messaging assignment could include a budgeting component complimenting a traditional design element. By thoughtfully integrating content from multiple disciplines, assignments will engage students in creative thinking through the necessity of translation among discipline content, and will also engage students in critical thinking to evaluate the resulting product. Allowing students to self-generate “real world” challenges to address in operative learning assignments facilitates student commitment to the project, and highlights the connections between coursework and the community.

Service-Learning: Service-learning, according to the National Service-Leaning Clearinghouse (n.d), is a pedagogy that strives to integrate meaningful community service with traditional classroom learning to enrich learning, foster student civic responsibilities, and strengthen communities. Thus, service-learning is not merely engaging in community service, but rather fostering translation between scholarly learning, and community application for the greater good. Service-learning initiatives have been shown to have numerous positive student learning outcomes including development of personal efficacy, leadership, communication, and sense of social responsibility (see Eyler, Giles Jr., Stenson, & Gray, 2001 for a comprehensive review).

Despite positive student learning outcomes, service-learning can be unsustainable, and very little has been written about the professor’s role in service-learning (Cushman, 2002). Thus, there is a need for faculty to have exemplar models of integrating service-learning principles with traditional classroom contexts to promote sustainable service-learning initiatives. By designing course objectives that promote the use of well-known teaching methods such as lectures and operative learning assignments that directly support service-learning initiatives, professors may be better able to maintain such initiatives.

Service-learning also provides a venue to foster the learning objectives outlined in the SOLL model. Knowledge transfer is a necessity in service-learning projects. Students are required to draw on their knowledge base in order to successfully engage and better communities. Because applied contexts are so varied, students will also necessarily engage in creative and critical thinking to

achieve their goals related to their particular community engagement opportunity. Students should critically evaluate creatively generated ideas, demonstrating that they are trustworthy participants in the engagement. Student identification of real-world issues that are course relevant begins to foster connection with the community. Engaging directly with those issues furthers this connection in meaningful ways. If lecture and operative learning reliably highlighted the importance of synergies among multi-disciplinary knowledge, creative and critical thinking, and bridge building, sustainable and fruitful service-learning outcomes should result.

Case Study 1: Application of SOLL to Post-Graduate Course Development

The SOLL framework was first applied in an introduction to research post-graduate course in the consumer sciences.

Lecture Learning: Lectures were delivered twice per week in 75-minute sessions. Lectures primarily involved critical evaluation and discussion of scholarly research papers across disciplines in the consumer sciences. Class time additionally provided a platform for guest lectures from experts in multiple domains of the consumer sciences, providing multi-disciplinary content exposure to students. Knowledge-transfer was facilitated by choosing course readings from a variety of disciplines that addressed similar content issues, fostering comparison and contrast among perspectives. Students were required to demonstrate creative thinking through generating multi-disciplinary perspectives of content application, and then demonstrate critical thinking to evaluate those generated perspectives. Bridge building was conducted at this phase by probing questions that stressed the importance of applicability and translation of research papers across different communities.

Operational Learning: Knowledge transfer was facilitated through operative learning in a number of ways. First, students were required to attend research talks across campus, promoting the use of academic skills in areas outside of expertise while also fostering connections among disciplines. Students were required to write academic abstracts for talks attended which were to include both content and applicability. This facilitated student learning of cross-discipline content, the applicability of that content, and as well fostering a critical academic skill. Students also engaged in multi-disciplinary literature reviews. Additionally, students chose to write a grant application for a project that required them to make multi-disciplinary connections in a highly valued academic context.

Operative critical and creative thought initiatives were paramount in this class. Discussions and assignments highlighted for students that many critical questions could be applied across disciplines, such as considering the nature of an experimental sample. Additionally, it was discussed at length how to integrate multiple methodologies to address one common problem. Through the use of carefully planned multi-disciplinary speakers who shared common themes, students were able to gain both creative and critical “a-ha!” moments as they became aware of the connections between different methods and approaches.

This was evidenced in final papers where many students generated very creative syntheses among concepts covered in this class.

Finally, evidence-based bridge building through operative learning was crucial in this class. Students were taught practical research skills through two hands-on library search seminars, two required oral research talks, repeated abstract writing, and a final research proposal, all of which contained requirements for making “real-world” applicability connections. Implementing multiple instances of learning for each skill allowed for skill practice and development based on explicit feedback from the instructor. Students reported that they appreciated these repeated learning experiences to develop expertise.

Service-Learning: Service-learning was a new concept to the graduate students involved in this project. To facilitate experiential service-learning, students were asked to choose a not-for-profit agency to learn about and work with. The students chose a national not-for-profit that promotes financial literacy, a topic that students in the class were passionate about. Students then engaged in a four-pronged service-learning project.

The first prong of this project required students to conduct background research on financial literacy, specifically exploring how to measure financial literacy. This prong specifically facilitated knowledge transfer, as financial literacy is a complex and multi-faceted problem. The second prong of this project focused on student research. Specifically, students applied for ethics clearance, programmed a Qualtrics survey on financial literacy, and conducted this survey of financial literacy in the local area. This research was conducted to facilitate critical thinking with the goal of applying student findings to assist the organization in their mission of increasing financial literacy. Third, students conducted a comprehensive audit of the online promotional materials for their chosen organization, providing evidence-based recommendations for improvement, further integrating knowledge from multiple disciplines and fostering both creative and critical thought. Finally, students engaged in canvassing on behalf of the organization, by handing out educational and promotional materials. This was the culmination of the application of SOLL, connecting students to an overarching mission of course-relevant community engagement. Students were fortunate to have received the grant mentioned in the operative learning section to fund this engagement process.

Graduate-level Outcomes Associated with Applying the SOLL Framework:

As a result of fostering knowledge transfer, critical and creative thinking, and scientific insights across three levels of learning, there were a number of tangible positive outcomes. First, students gained opportunities to compare and contrast course lecture material across disciplines. This provided opportunities for students to practice critical evaluation of content across many domains, facilitating knowledge and skill transfer. Second, students gained experience applying for grant funding and applying for ethics clearance. These are critical experiences for any student planning to conduct research during their career. Third, most students in the course encountered their first experience collecting

survey data. This aspect of the project served to teach important concepts such as fair compensation, sampling techniques, and language-barrier considerations. Fourth, students were able to use their multi-disciplinary knowledge and skills to provide concrete, evidence-based suggestions for improvement to a promotional website to a not-for-profit organization. Finally, students were able to engage in promotion of an organization they felt passionate about.

Graduate-Level Limitations and Challenges:

Applying SOLL for the first time requires effort and professor engagement. With practice and publication of SOLL-based projects across courses, professor investment is expected to decrease. A second limitation is that it is easy to "dream big" as a professor when using SOLL. For example, the data collected in the post-graduate course is valuable. However, the semester has ended and it has been challenging to maintain student engagement in the process. SOLL projects should either be developed so as to be fully completed within a given course, or should be program-level initiatives with explicit carry-over between semesters.

A second, practical challenge resulted from all assignments being provided to students online in separated, distinct files. Although the intention was to provide clarity between assignments, separating the documents actually led to greater confusion and poor conceptual linkage between lecture, operative, and service-learning components. This limitation was corrected for in the following undergraduate course by providing all assignments in one file with more explicit connections.

Case Study 2: Application of SOLL to Undergraduate Course Development

The SOLL model was applied to an undergraduate course in visual merchandising.

Lecture Learning: In this course, students met three times per week. Two meetings were lectures that were 50 minutes in length. Lectures covered traditional visual merchandising display content, in addition to social influence techniques that provided students with evidence-based, scholarly information regarding features compelling communication strategies. Lectures regularly featured videos and demonstrations to illustrate course concepts, in addition to guest-speakers and a field trip.

Students were regularly and intentionally asked to draw upon knowledge from other courses to shed new insights on current course material, fostering knowledge-transfer. Additionally, students were asked to provide creative and critical insights into problem solving issues that arose as a result of class discussion. For example, students were asked about ways to minimize theft through merchandising (creative thinking), and then were asked why those methods might fail (integrating critical thinking). Finally, lectures also included guest speakers from community retailers, and a field trip to a local retailer to foster bridge building.

Operational Learning: In order to facilitate knowledge transfer between lecture content, course prerequisite content, and skill development, this course had weekly laboratory sessions that lasted for 1 hour and 50 minutes. This was the only required laboratory-based course within the departmental course curriculum, and thus labs in this context were a novel experience for many students. Facilitating knowledge transfer, weekly lab assignments required application of multi-disciplinary content including budgeting, application of communication techniques in display, floor layout, and store design. Students engaged in critical evaluation of their creative ideas, as assignments required evidence-based justification of any recommendations made through the lab assignments (see Norris, 2013 for a laboratory guide focused on translating theory to practice). Fostering responsible bridge building, students were asked to continually think about the impact (positive and negative) of their generated merchandising plans in various communities.

Service-Learning: Service-learning is a still a new concept to many undergraduate students. To facilitate the teaching of service-learning pedagogy, students were first assigned a project to create a display that promoted service-learning activities currently happening within the department at differing levels: student engagement in service-learning activities, faculty engagement in service-learning activities, and departmental involvement in service-learning activities. This allowed students to become familiar with the nature of service-learning engagements, and helped to create a buzz around the positive engagements happening within the institution.

Following the first program-based display project, students were asked to identify the names of not-for-profit organizations that they would like to work with. The professor first contacted those organizations and asked whether they would like to work with the visual merchandising class such that students would interview the organization to determine organization goals, and students would then create a promotional display for the organization on campus at a local location of the organization's choice.

Facilitating knowledge transfer at this level was paramount for success. Students were provided a comprehensive assignment guide (see Lab 5 in Norris, 2013) that prodded connections between lecture and laboratory content and the final service-learning display. Students necessarily engaged in creative and critical thinking when generating promotional material for their not-for-profit partner. Students were guided to provide evidence-based considerations for display goals, and then were encouraged to generate ways of achieving those goals that could be supported by evidence learned in class. This evidence-based evaluation of creative ideas fostered both comprehensive thought and evidence-based engagement.

Undergraduate Outcomes Associated With Applying The SOLL Framework:

By following the SOLL framework for undergraduate course development, a number of important educational goals were satisfied. First, students gained necessary knowledge from lectures specific to the creation of compelling

merchandising, and students were encouraged to link this knowledge with what they had learned from other courses and life experience. Second, students gained safe, hands-on experience applying knowledge and developing skills through laboratory activities. Integral to all of these assignments was the requirement for students to provide scholarly justification for opinions provided. Creativity was encouraged, as was scholarly justification of newly created ideas prior to implementation. Providing such justification was challenging for students, highlighting the need to teach responsible, evidence-supported engagement. Third, students were able to apply their knowledge and skills in the "real-world" via a service-learning project that allowed them to gain recognized experience in merchandising in such a way that also bettered the community. Because students generated organizations for which to engage with, students had true ownership over their project.

In order to achieve success and maintain student motivation, a key component to such skill development was the opportunity for students to re-do any written assignments throughout the term within a week of receiving written feedback and their initial grade. Many students took advantage of the opportunity, gaining skill practice based on feedback and improving their grade.

Undergraduate Limitations and Challenges:

The application of SOLL to an undergraduate visual merchandising course was the second application of the framework and thus this initiative benefitted from valuable experience. Notably, the development of a comprehensive laboratory guide that dovetailed with the course syllabus ensured student expectations and conceptual linkages were clear. Having a detailed laboratory guide in advance of the course made not only student life easier, but also made execution and connection much easier from an instructor standpoint. Administration time was very low, and student interaction time was high.

A challenge associated with SOLL is that it places a high degree of responsibility on students to carry out tasks, especially when engaging with community organizations. As a result of students generating the organizations to work with, the students were invested and committed to their tasks. However, ensuring that organizations have open and direct communication with the instructor is essential in maintaining positive outcomes in case student initiative wanes.

This specific SOLL application had inherent financial costs. Specifically, costs included materials for display and student transportation costs. The author was fortunate to receive a grant to administer this project that covered fees. Objects purchased for display will be stored and reused in future projects to minimize future costs.

General Discussion

Multi-disciplinary programs are pivotal, preparing students to be well-rounded in their area of expertise and thus able to make unique and critical insights. In order to foster credible multi-discipline learning, faculty can benefit from a multi-level framework for course and curriculum development. The SOLL

framework for course development provides a guide for such multi-level learning by first laying a knowledge foundation through lecture-based learning. Once content has been disseminated, operative learning can occur that promotes skill creation and refinement in a laboratory setting. Once necessary skills have developed, engaging in service-learning allows skill demonstration in a context that is beneficial for both students and the community. SOLL extends past research by stressing the importance of knowledge transfer, understanding of scientific method, and both creative and critical thinking within each level of learning.

Tangible Positive Outcomes

Graduate students learned content through lectures, completed skills-based assignments, and engaged in a service-learning project. Graduate students were able to successfully apply for funds for an interdisciplinary project that sought to improve financial literacy through promotion of a not-for-profit organization. This not only led to a positive experience for those involved, but also led to significant student C.V. development. For example, students were able to include successful achievement of grant funding to their list of accomplishments, and many students chose to present their findings at local conferences.

Undergraduate students learned display and evidence-based communication concepts through lectures, and industry-relevant skills related to concept application through lab assignments. The opportunity for students to re-do lab assignments following instructor feedback allowed for constructive feedback to be incorporated into revisions resulting in additional skill practice, and improved grades upon resubmission. Finally, students were able to have ownership over a very positive service-learning project by choosing a not-for-profit organization with which to work, and students will be able to include this work in developing portfolios.

Unresolved Issues and Future Directions

Engaging in multi-level learning fosters credibility in students and promotes positive engagement, but also requires instructor time and institution financial support. Such hindrances may have contributed to past findings that service-learning projects tend to be unsustainable. These constraints are likely to be mitigated through advanced planning, detailed syllabi and laboratory guides, and by creative attainment of required materials either by way of teaching grants, or by reusing already available materials.

Importantly, to date much of the research on service-learning has focused on student and community perceptions of success, with few instructor narratives being readily available. This prevents careful consideration of what surely are diverse instructor perceptions regarding barriers and benefits of service-learning engagements. Given the resource-intensive nature of service-learning, the field will benefit from an intentional exploration of instructor experiences. Providing examples of (un)successful engagement initiatives will provide opportunities for the service-learning community to learn, benefitting from the experiences of

others. Empirically studying the efficacy of guides for how to implement service-learning will also help to build a solid foundation from which to develop sustainable service-learning engagements.

In summary, SOLL course development combines lecture, operational, and service-learning to teach knowledge transfer, critical and creative thought integration, and scientific inquiry. The current work demonstrated application of SOLL to both graduate and undergraduate students in consumer sciences. SOLL can be used to foster multi-disciplinary knowledge breath in many content areas, and is intended to promote a sustainable foundation for developing skills that are necessary for effective translation to community application.

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Acknowledgements
The engagements discussed in this paper were made possible through generous support from the *Purdue University Teaching for Tomorrow Award*, the *Purdue University Service-Learning Faculty Development Grant*, and the *Purdue University Student Grant Program for Community Service/Service Leaning Projects*. I give heartfelt thanks to the student and community participants I have been fortunate to work with since first learning about service-learning in 2011—you have truly inspired me to see the importance of, and need for, rigorous community-focused experiential learning opportunities.