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The **Information Systems Education Journal (ISEDJ)** is a double-blind peer-reviewed academic journal published by **EDSIG**, the Education Special Interest Group of AITP, the Association of Information Technology Professionals (Chicago, Illinois). Publishing frequency is six times per year. The first year of publication was 2003.

ISEDJ is published online (<http://isedj.org>). Our sister publication, the Proceedings of EDSIGCon (<http://www.edsigcon.org>) features all papers, panels, workshops, and presentations from the conference.

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Information Systems Education Journal is pleased to be listed in the 1st Edition of Cabell's Directory of Publishing Opportunities in Educational Technology and Library Science, in both the electronic and printed editions. Questions should be addressed to the editor at editor@isedj.org or the publisher at publisher@isedj.org. Special thanks to members of AITP-EDSIG who perform the editorial and review processes for ISEDJ.

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Towards Improved Student Experiences in Service Learning in Information Systems Courses

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Abstract

The paper explores relevant past research on service-learning in Information Systems courses since 2000. One of the conclusions from this is that most of the publications are not founded on specific theoretical models and are mainly about sharing instructor or student experiences. Then several theoretical frameworks from Education and other disciplines and their relevance for service-learning are analyzed. As a result, several directions for future research towards improvement of service-learning in IS education are proposed.

Keywords: service-learning, IS education, experiential learning, active learning.

1. INTRODUCTION

Service-learning is an educational approach that balances formal instruction and direction with the opportunity to serve in the community in order to provide a pragmatic, progressive learning experience (Bingle & Hatcher, 1995). The recent interest in service-learning (SL) has been strengthened by the work of national organizations interested in combining service and education such as Campus Compact, American Association for Higher Education, Council of Independent Colleges, Council for Adult Experiential Learning and The National Center for Service-Learning and the Partnership for Service-Learning.

Academic programs in the Humanities like psychology, education, sociology, social work, nursing and many others have a well-established record of research and implementation of service-learning (see Welch, 2002 and others). Service-learning is increasingly applied in business disciplines as well (Andrews, 2007). That paper summarizes conceptual and general business research on service learning. The author suggests that theoretical work on SL can be linked to institutional characteristics, instructional methods, personal development or learning

outcomes. An overview of applications of service learning in business core areas is presented but there is no reference to any publications related to SL in Management Information Systems (see Andrews, 2007).

Several papers appearing at the start of this century pointed to the relevance of service-learning in Information Systems (IS) programs and the opportunities for practicing it (Lazar & Lidtke, 2002; Hoxmeyer & Lenk, 2003; and others). A general conclusion from them is that service-learning is applicable in the information systems discipline.

There are quite a few papers on service-learning in Information Systems published after 2003 including Preiser-Houy and Navarette (2006), Wei, Siow & Burley (2007), Petkova (2012), Chuang and Chen (2013) and others. However, they focus mostly on descriptions of experiences without attempting to systematically generalize findings and present a structured view and understanding of the process of SL. While there are considerable number of publications on SL and tradition in the use of experiential learning in the disciplines of Information Systems, Computer Science (CS) and Information Technology (IT), service-learning has not taken yet the place it

deserves in them. Part of the reasons for that are associated with the lack of a sufficiently comprehensive approach to guide the design and implementation of SL courses in IS or CS.

The *goal of this paper* is to propose a set of research directions on service-learning that can deliver improved student experiences in an IS program. Its contribution is in linking of several general theoretical concepts in education that have been applied before to SL research to possible future investigations on their application to SL in Information Systems. This work is part of a larger project on analysis and improvement of service-learning in an IS program. The paper proceeds with a brief review of past publications on service-learning in Information Systems, followed by an analysis of models and frameworks for service-learning in other disciplines and concluding with the proposed directions for research and practical work towards a comprehensive framework for design and implementation of service-learning student experience in Information Systems courses and improved student learning experience through SL.

2. BRIEF REVIEW OF PUBLISHED PAPERS ON SERVICE-LEARNING IN THE DISCIPLINE OF INFORMATION SYSTEMS

The following literature analysis is structured mainly according to the type of courses in which service learning was applied in the IS discipline. It does not aim to provide an exhaustive review of IS service learning publications but to identify relevant representative research in that area.

Rathshwohle (2000) provides some of the first accounts of service-learning in Information systems courses. In his paper the author describes the work on several web development projects with community partners as part of an introductory IS course. Another paper by the author illustrates how students in an introductory IS course at the University of San Diego serve as mentors of high school students in their computing classes which is a unique example of service-learning in IS from the literature that was studied (see Rathshwohle (2003).

A similar type of service learning experiences of students in an introductory IS course at a Jesuit university based on the Ignatian Pedagogical Paradigm of context, experience, reflection, action and evaluation is presented by Tellis and Campbell (2004). In some cases students taught high school students or other members of a local community including large percentage of

immigrants or simply helped them gain more confidence with the use of computers.

Preiser-Houy and Navarette (2006) analyze student learning and transformation of the students into engaged and active learners through a community-based research project in a web-based systems development course. Their work is valuable for the identification of the student learning outcomes at various stages of the project and for the formulation of ways in which SL complements the technical aspects of software development technical skills.

The development of a web portal for a non-profit organization is the focus of the custom designed interdisciplinary course "Community Empowering through Information Systems and Technology", described by Lawler and Joseph (2009). Lessons learned from SL in IS are presented in Lawler & Li (2005). In both cases the findings of the authors indicated improved student engagement, better results for non- IS students and higher learning. In addition, there was improvement in the pedagogy of instructors in information systems initiating interesting projects in service learning.

Further examples of undergraduate pre-capstone service-learning experiences in web development and database classes are provided in Citurs (2009). That paper provides also well researched argument for the alignment of service learning components in IS classes with the goals of liberal arts education and discusses issues of improving student engagement through SL.

Saulnier (2003) shares his students' SL experiences in a Systems Analysis and Design course. He concludes that the students in such a course should have not only the professional skill sets but also they should understand the civic responsibility associated with being educated corporate and community citizens as those factors contribute to significant learning that provides lasting change. Those ideas are further developed in Saulnier (2004) and are enhanced with some strategies for involving faculty in service learning teaching. Saulnier (2004) discusses also the theoretical background of service-learning, its applicability to the discipline of Information Systems and the suitability of different Information Systems courses to service-learning projects.

Student SL experiences in systems analysis and design and software engineering are also studied in Lennox (2009) and Chuang & Chen (2013). In both papers are provided reflections on how SL

affects the course structure, what is the response of the university community partners and on student learning. The lessons learned from applying SL for over 10 years in Database design, systems development, accounting information systems and e-commerce are summarized in Hoxmeyer & Lenk, 2003.

The instructor and student experiences in project management courses are discussed by McCoy & Wimer (2010) and Petkova (2012). The nature of projects in the first paper is diverse, ranging from web development to implementation of databases and networks. Petkova (2012) combines elements of the approaches suggested in Wilcox & Zigurs (2003) and Wei, Siow & Burley (2007) in a pre-capstone project management course with projects for non-profit organizations and small businesses.

The need to include SL in Information Systems courses and especially in the capstone integrative projects and the problems related to them are analyzed in Reinicke and Janicki, 2007. The paper provides useful insights in the concerns of the clients including difficulty in formulating requirements and lack of funding as well as the management of the client-developer relationship in SL projects.

A conclusion from the above analysis is that while some authors relate their service-learning experiences to particular pedagogical principles and frameworks (e.g. Saulnier, 2004; Citurs, 2009; Abrahams & Singh, 2010), most of the papers on service-learning in Information Systems simply aim to share educational experiences and to promote interest toward community engaged service-learning in the academic community. Hence the need for a more detailed analysis of different models, frameworks and approaches to service-learning that is going to be presented in the next section.

3. ANALYSIS OF MODELS, FRAMES AND APPROACHES RELATED TO SERVICE-LEARNING AND THEIR RELEVANCE FOR IMPROVEMENT OF SERVICE LEARNING

Most of the following models related to SL are from education and other disciplines and one is from the IS field (Wilcox and Zigurs (2003).

On Models/Types of Service-Learning

According to Heffernan (2001), there are six models for Service-Learning: (1) "Pure" Service-Learning, (2) Discipline-Based Service-Learning, (3) Problem-Based Service-Learning (PBSL), (4) Capstone Courses, (5) Service Internships and

(6) Undergraduate Community-Based Action Research.

Adhering to this classification, only two of the examples listed in the previous section, namely the ones by Ratshwohl (2003) and Lawler and Joseph (2009) represent "pure" service-learning. The model of "pure" service-learning is rather suitable for interdisciplinary courses and courses within the humanitarian disciplines.

Most of the service-learning experiences reported in the IS literature are a mixture of Discipline-Based-Service-Learning, where "students are expected to have a presence in the community throughout the semester and reflect on their experiences on a regular basis throughout the semester using course content as a basis for their analysis and understanding" (Heffernan, 2001) or Problem-Based Service-Learning, in which the students' role is explained by Heffernan (2001) as "consultants" working for a "client". When offered in the final year of a program and drawing upon knowledge and skills obtained from all other courses in this program, combined with relevant community service work, the service-learning experience is classified as a "capstone" experience.

Although very relevant to information systems education, and widely represented in the literature, Service Internship as a model of service-learning is outside the focus of this paper and will not be discussed here. The last model of service-learning, Undergraduate Community-Based Action Research, which is somewhat similar to an independent study if it involves active engagement of a student with the subjects of his/her study, is a relatively new approach for IS education and to the best knowledge of the author there are no published examples in IS or CS of this type of service-learning.

The influence of Bloom's Taxonomy of Learning and Kolb's Experiential Learning Model

The widely popular Bloom's taxonomy of learning (Bloom et al., 1956) in its original form is shown in Fig.1. It is used by many educators today to promote active learning, to set up learning objectives and to assess the learning achievements of their students.

In the subsequent improved version of Bloom's taxonomy (see Krathwohl, 2002), the six hierarchical levels of learning-knowledge, comprehension, application, analysis, synthesis, and evaluation are transformed into

Remembering, Understanding, Applying, Analyzing, Evaluating and Creating (see Fig.2).

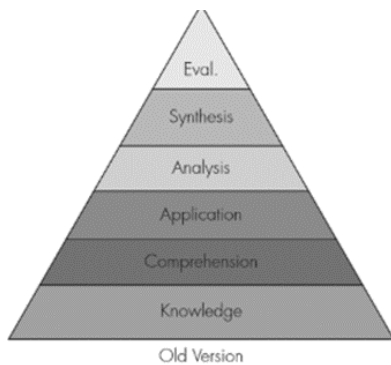


Fig.1. Bloom's Taxonomy- original version (based on Bloom et al., 1956)

The modified naming of the levels of student learning in Krathwohl (2002) is probably more suitable for reflecting on the sophisticated learning processes taking place in the information systems classroom. More empirical evidence is needed however to justify that conclusion.

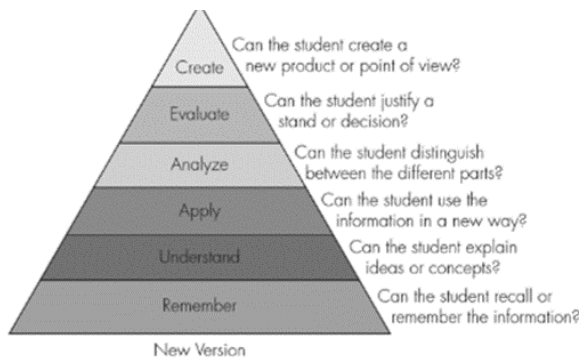


Fig.2. Bloom's Taxonomy- new version (after Krathwohl, 2002)

Since service-learning is a subset of experiential learning, it is not possible to understand the processes of service-learning without considering Kolb's experiential learning model (Kolb, 1984). In this model, students obtain real, concrete knowledge (defined also as learning by feeling), observe and reflect on their experience (learning by thinking about what was observed), generalize what they learned through abstract conceptualization (learning by thinking), and actively experiment in new situations (learning by doing) (see Fig.3).

By following Kolb's experiential learning model instructors can design service-learning projects that could help the information systems students to move successfully into handling tasks at the

highest advanced levels of Bloom's taxonomy and to be ready for employment in the real world.

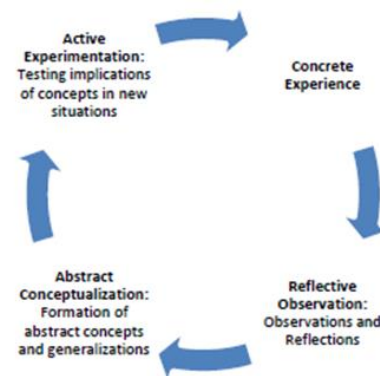


Fig. 3. Kolb's Experiential Learning Model (after Kolb, 1984)

Some of the authors mentioned in the second section of the paper position their theoretical understanding of service-learning pedagogy on Bloom's Taxonomy and Kolb's Experiential Learning Model (Citurs, 2009; Abrahams & Singh, 2010; Petkova, 2012; Chuang & Chen, 2013) and roughly follow the four steps (phases) of Kolb's model in their analysis.

In a few cases authors move a step beyond following the original model and modify it in order to make it more suitable for the purpose of designing service-learning courses. For example, borrowing ideas from Kolb (1984), and based on their e-Commerce service-learning course, Abrahams and Singh (2010) propose a replicable model for experiential learning (see Fig.4).



Fig.4. A Replicable Experiential Learning Cycle for Information Technology Students (after Abrahams & Singh, 2010)

The model facilitates attainment of the learning levels defined in Bloom's Taxonomy and consists of six steps: Identify, Assess, Deploy, Implement, Evaluate and Revise. Documentation and Project Management are important in every step and they are also included in Abrahams & Singh (2010) model.

Although good for understanding of the basic pedagogical principles of service-learning, Kolb's model of experiential learning and Bloom's Taxonomy are not sufficient to be used on their own as tools for design of service-learning projects. The complexity of the learning environment requires the inclusion of additional elements in the models explaining student learning through SL.

Inclusion of Roles, Techniques and Deliverables

Wilcox and Zigurs (2003) borrow concepts from agile methodologies for systems development projects and apply them to the field of service-learning in order to create a new service-learning method. Their method includes phases, techniques, deliverables, roles, and an underlying philosophy.

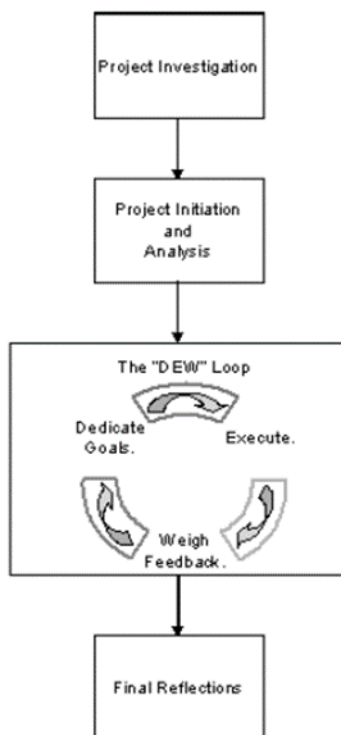


Fig. 5 Phases of a Method for Service-Learning Projects (after Wilcox & Zigurs, 2003)

The Wilcox and Zigurs method consists of four phases: Project investigation, Project initiation and analysis, "DEW" loop (dedicate goals, execute and weigh feedback) and Final reflections. In any educational situation stakeholders are very important, but in service-learning apart from students and instructors, the community has also a significant role. This is why the explicit underlying philosophy of the proposed method for service-learning is that the stakeholders drive the process and success of the project.

Wilcox & Zigurs (2003) provide also examples of possible techniques and templates to be used in the different phases of SL projects and their deliverables (the results of carrying out of various techniques). They point however that their work which is based on established processes in the field of Information Systems, it is not tested in practical projects.

Inclusion of Communication Flows

Wei et al. (2007) improve on the Wilcox & Zigurs method of service-learning by including communication channels and information interchange between the students, educators and clients' community (see Fig. 6). The authors of this paper identify the following information and communication channels:

1. Educators design content and provide structured reflection opportunities
2. Students think and conceptualize knowledge
3. Educators contact clients for feedback
4. Clients send feedback to educators about students' performance
5. Students work with the community/clients
6. Clients provide requirements details and feedback to students
7. Educators coordinate students and clients

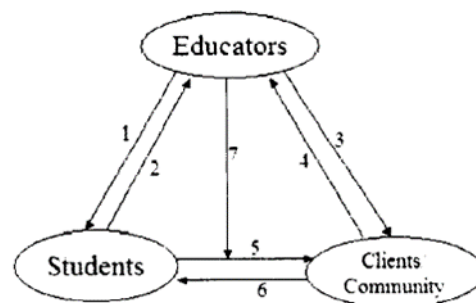


Fig. 6 Information and communication channels between students, educators and community (after Wei et al., 2007)

Critical success factors for service-learning in IS courses have been identified by Wilcox & Zigurs (2003) and Lawler (2011). There is an opportunity to explore further how these are manifested in different educational projects.

The above overview of several relevant frameworks from education and IS and their application to SL research in Information Systems can be used for the generation of research directions to improve student experiences in service-learning in Information Systems discussed in the next section.

4. ON POSSIBLE RESEARCH DIRECTIONS ON SERVICE-LEARNING IN INFORMATION SYSTEMS PROGRAMS

The previous analysis of service-learning in IS education was mainly concerned with course level evaluation of SL. It seems that dedicating to service-learning just one or two courses in an academic program will not provide the needed transformation of IS education towards greater role of service-learning in improving student engagement and learning. Another conclusion is that a single experiment of a new idea on service-learning in IS at a particular university is not sufficient to transform SL in an academic program or the discipline of Information Systems. Hence the motivation for the following possible directions for research on service-learning in IS education and practical steps towards improved student experience:

- What kind of model/type of service learning in Heffernan's (2001) typology is better suited to different IS courses on the basis of delivered improvement of the measured quality of student learning?
- Drawing on the interactive nature of the relationship between software developers and clients, there is potential to study service learning in IS projects through the action research model (see Baskerville and Wood-Harper, 1996). This requires the careful archiving of cases and gathered evidence on the usefulness of applying Action Research in SL in IT educational projects.
- Gather evidence on the effectiveness of the new form of Bloom's taxonomy of learning (see Krathwohl, 2002) for promoting better service-learning in IS courses.
- Analyze empirical evidence on various forms of documentation of students' concrete experiences in SL courses

related to the stages of Kolb's learning cycle (see Kolb, 1984).

- Gather and analyze empirical evidence on the effectiveness to SL in IS courses of any modifications of Kolb's learning cycle, including the replicable experiential learning cycle of Abraham & Singh (2010).
- Compare the effectiveness in IS education of the replicable experiential learning cycle of Abraham & Singh (2010) and Kolb's learning cycle.
- Explore and propose ways for documentation of evidence on student learning in IS education not just in single courses but at program level as well through appropriate assessment methods for student-learning at program level.
- Gather empirical evidence on the effectiveness of applying the SL method proposed by Wilcox & Zigurs (2003).
- Develop ways that extend any approaches for measuring the impact of SL in individual IS courses to the broader problem of assessing the impact of SL on IS programs.
- Test further the knowledge on critical success factors for service-learning in IS courses as formulated by Wilcox & Zigurs (2003) and Lawler (2011) in new courses exploring various stakeholder characteristics and technologies.
- Encourage the conducting and reporting of results of confirmatory studies replicating the findings of published works in SL in IS education.
 - Archive in an online accessible repository reference details on published research on service learning in IS/IT education.
- Organize special streams on service-learning in IS education at specialized IT conferences and seek further ways for institutionalizing research on SL in IS education within the IS and related computing disciplines.

The above research directions are quite broad in nature but they can be flexibly modified within the environment of a particular academic program if necessary and through the cooperative efforts of communities of IS educators across different existing professional societies.

5. CONCLUSION

The paper was motivated by the lack of comprehensive frameworks guiding the design and implementation of service-learning courses in

an Information Systems program. It provided an overview of the relatively scarce previous published research on SL in IS education and on relevant theoretical models or frameworks from Education that were proposed in the past to support service-learning. As a result a set of research directions on SL in information systems was proposed. They are probably too ambitious for a single researcher or a small group of IS educators in an academic department but they require cooperation through professional societies and beyond. That may not be impossible given the noble goal that is pursued – improved student experiential learning in Information Systems. The proposed research directions require coordinated effort by many individuals in small realistic steps towards the improvement of SL in Information Systems education.

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