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A Technology-based Service-learning Project to Connect Community-School Relationships in a Vocational College Course

by

Wei-Lun (William) Li

A dissertation proposal submitted in partial fulfillment of the requirements for the degree of Doctor of Education – Educational Leadership (Instructional Technology emphasis)

College of Education

Idaho State University

Summer 2017

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I agree that this study qualifies as exempt from review under the following guideline: Category 1: Normal educational practices & settings. This letter is your approval, please, keep this document in a safe place.

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Sincerely,

Ralph Baergen, PhD, MPH, CIP
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ABSTRACT

The purpose of this study was to analyze, design, develop, implement, and evaluate an online multimedia instructional module in a service-learning project program. In order to examine the effect on learner knowledge and resulting performance, an Information Technology Service-Learning-Based multimedia module for service-learning history, development, and function, and a researcher-created Service-Learning Technology Project Proposal rubric were developed and validated.

Three Reusable Learning Objects (RLOs) made up the multimedia module that was developed following the ADDIE model of instructional design and a modified Delphi Method evaluation process with suggestions from a review panel of subject matter experts. Two graders rated the resultant proposals using the validated rubric which served as the form of assessment. A modified quasi-experimental, post-test, control-group design was used in this study. The participants of this research were enrolled in two class sections of a multimedia design course with one section serving as the experimental group (online) and the other as the control group (face-to-face). The experimental group was taught using the three RLOs within Moodle and Blogger learning management systems, while the control group attended a traditional face-to-face class and did not receive the three RLOs. The instructional treatment period was eight weeks.

An independent *t*-test was used to analyze the project performance scores; results indicated there was no significant difference between the two groups in overall performance.

CHAPTER I

Introduction

The Ministry of Education (MOE) in Taiwan has actively promoted "the financial subsidy of a service-learning curriculum in college" (Service-learning Network 2009, para. 1). The program's aim was to illustrate and encourage domestic colleges and universities to promote community service, which included service-learning, in their courses to help students apply classroom learning to their self-reflection abilities. This also allowed students to appreciate diversity, to understand social issues, and to cultivate civic capacity (MOE, 2008). The benefits derived from student involvement in service-learning activities may be grouped into four broad categories: 1) enhancement in the learning of material that is part of the traditional in-school curriculum; 2) promotion of personal development; 3) fostering of the development of civic responsibility and other values of citizenship; and, 4) benefits to the community (Waterman, 1997).

Yan (2009) reported that 59 school applications for service-learning were reviewed by the Taiwanese Ministry of Education in 2008, and 37 schools received grants amounting to 4,173 million NT$ (National Taiwan dollars). Yan estimated 50,000 college students were expected to take part in the service-learning content through their coursework in 2008. From these figures, it is apparent that promoting service-learning within coursework has become a key policy of the Ministry of Education. The purpose of this policy is to promote and deepen the educational experience of the practical internship within the existing information technology (IT) courses.

The subsidies offered by the MOE show that service-learning is valued and has become an essential part of the educational system in Taiwan. Thus, through service-learning, universities are giving back to their communities as students complete

their internships, and this, in turn, supports these universities in creating a relationship of reciprocity with their communities. The educational system in Taiwan has created a positive cycle of service that will affect society for years to come.

Senior-level students participating in project work design in Information Management Departments have a required course in which a project must be completed in one year in order to graduate. To create and implement their projects, these students can take advantage of funding that has been made available by the Executive Yuan (2009), the leading minister in the Taiwanese government who proposed a multi-year plan based on 12 principles that were known as the "12 Building the Wisdom of Taiwan Project." This project was funded to create a number of digital opportunities for the students and citizens of Taiwan. The plan was proposed as a new blueprint for economic development.

In concert with the proposal of the Executive Yuan, the Ministry of Education Information Volunteers Operation Center's Recruitment Brochure (2011) in Taiwan called for a renewed spirit of service-learning, and the recruitment of volunteers to apply their expertise in information service activities was undertaken. (This document is translated to English and shown in Appendix A.) The goal of service-learning under these mandates was to create digital opportunities for remote locations and to reduce the digital divide between rural and urban areas. Service-learning projects are a means to overcome this digital divide, because, in addition to the services provided by the volunteer students, service-learning is thought to afford valuable first-hand knowledge that could be fulfilling for students and community members.

The process of engagement and contact also provides care opportunities and experiences where students can learn about providing technology services to others. The promotion of service-learning also embraces the boundless opportunities for learning outside the classroom. Through service-learning projects, the technology students who serve as volunteers strengthen their own academic achievement through both learning and teaching. This can fulfill another goal of the Ministry of Education, which is for the volunteers who serve on Information Technology Plan Promotion Teams to have opportunities for personal achievement and self-growth, and to eventually become involved in Taiwanese society, or even global society, in ways that increase their value as information technology human resources.

In relation to this topic, the United States has also had valuable programs that develop and enhance the service-learning process. The 2010 Learn and Serve America Higher Education grant was a federally funded program that distributed sizable dollar amounts to educational institutions, which promoted service-learning projects (Learn and Serve America Higher Education FY 2010, n.d.). There were two priorities to ensure funding from the United States-based Corporation for National and Community Service. The first was that an institution embeds service-learning in teacher training. This means that a large focus should be placed on educating teachers about the value service-learning holds in their classrooms. This is important because if service-learning can be implemented when constructing teacher education courses, it is an investment in future learning, and this philosophy will be imparted to the K-12 students of the teachers who trained in these courses when they acquire their own classrooms. A second priority this program has adopted is covered in the STEM (science, technology, engineering, and

mathematics) disciplines method, which provides real-world contexts for classroom content.

The 2010 Learn and Serve America Higher Education grant program focused on engaging academic learning with essential workplace skills, such as developing critical thinking, cooperative learning, and effective communication. It was hoped that by implementing the STEM methods as early as kindergarten, interest may be cultivated in the disciplines under the STEM umbrella. The 2010 Learn and Serve America Higher Education grant had a strong focus on service-learning and could be used to help in the understanding of the slogan, "giving back to the community." These programs illustrate the value seen in service-learning integration within coursework in an education system outside Taiwan.

Statement of the Problem

Based on the information given above, there was a need for Taiwanese colleges to develop courses for service-learning projects. While information system technology courses that required the demonstration of technology skills via practical (real-world) projects exist at most colleges in Taiwan, there was a lack of planned, purposeful incorporation of service-learning within these courses. The Taiwanese government emphasized the need for more reflection through active service-learning that benefited the community.

For service-learning to be integrated within existing technology projects in courses, there was a need to define the project (the domain) and to develop performance assessment guidelines that integrated tasks and evaluation criteria consistent with the principles of effective service-learning while acknowledging the need for the assessment

of technology skills demonstrated during the internship. There was also the need for a valid and reliable scoring rubric that was aligned with the service-learning objectives.

Purpose of the Study

This study had three purposes. The first was to develop and validate the Information Technology Service-Learning-Based (ITSLB) online multimedia module for teaching a service-learning curriculum based on the MOE service-learning expectations. These expectations are listed in the MOE's brochure on service-learning (Appendix A). A second purpose of this study was to develop and then validate a Service-Learning Technology Project Proposal (SLTPP) rubric so that students' proposals could be assessed by a validated instrument that was aligned with MOE service-learning expectations. Finally, this study also examined whether the ITSLB multimedia module was as effective as traditional face-to-face instruction in teaching the MOE service-learning standards, as indicated by a comparison of online and traditional student scores on the SLTPP rubric.

Research Questions

The research questions for this study are as follows:

1. Can service-learning standards be integrated into a technology work project that leads to a performance assessment for vocational college students with respect to service-learning outcomes?
    a. Do the rationale, goals, and objectives identified for the ITSLB (Information Technology Service-Learning-Based) instruction align with the MOE (Ministry of Education) expectations for service learning?
    b. Do the learning outcomes, learning hierarchy, and learner influences identified for the ITSLB instruction align with the MOE (Ministry of Education) expectations for service learning?
    c. Do the learner characteristics profile, pedagogical considerations, learner constraints, and learning environment and delivery identified for the ITSLB instruction align with the MOE (Ministry of Education) expectations for service learning?

   d. Does the service-learning content identified for the ITSLB instruction align with the MOE (Ministry of Education) expectations for service learning?
   e. Do the project flowcharts and the project storyboards identified for the ITSLB instruction align with the MOE (Ministry of Education) expectations for service learning?

2. Does the SLTPP rubric align with the MOE standards for service-learning performance?
   a. Does the SLTPP rubric have content validity in regards to the MOE standards for service-learning, as determined through a modified Delphi Method review?
   b. Does the ITSLB curriculum have content validity in regards to the MOE standards for service-learning, as determined through a modified Delphi Method review?

3. Is there a significant difference in performance between students who learn service-learning through a multimedia-based module and those who learn service-learning through a traditional presentation of the course curriculum, as measured by a researcher-created instrument?

Description of the Research Design

To examine these research questions, this study utilized a modified Delphi Method to validate both the researcher-created ITSLB multimedia instruction and the SLTPP rubric for the service-learning project proposal.

Based on MOE requirements, the researcher created an Information Technology Service-Learning-Based (ITSLB) multimedia module using the ADDIE instructional design process (Appendix B). Then, the students in the experimental group created their service-learning project proposals following the ITSLB module; the students in the control group created their service-learning project proposals through traditional (face-to-face, teacher-led) instruction. This was a quasi-experimental post-test, control group design, with the experimental group receiving the online ITSLB module (treatment) and the control group receiving traditional instruction (Figure 1).

	Treatment	SLTPP Rubric
Experimental Group	X	O^1
Control Group		O^2

Figure 1. Quasi-experimental post-test, control-group design

Limitations

Limitations are threats to the internal validity of a study, and are frequently beyond the researcher's control but can affect the outcomes of the study or how the consequences of the study are interpreted (Creswell, 2003; Gay, Mills, & Airasian, 2006). There were several limitations to consider when viewing the research for this project.

The first limitation was the use of the Delphi Method. This method had an inherent limitation for developing the scoring rubric for the IT service-learning project proposals, in that it was a method of soliciting opinions from experts, whose views, according to Kaynak, Bloom, and Leibold (1994), "are generally less satisfactory than hard facts" (p. 4). As with any opinion method, there is always the potential for both positive and negative views to be given equal weight. Therefore, no absolute assurance can be made that a rubric developed using the Delphi Method is a valid assessment; however, expert input would logically be more useful than the opinions of untrained individuals, and expert opinion is what is available at this stage of research.

Another limitation in regard to the nine Delphi surveys was that they were first written in English and then translated by the researcher into Mandarin for the review panel members in Taiwan. Although great effort was made to keep the same meaning in both languages, there is the possibility that something was lost or added in translation due to cultural differences. Likewise, the rubric for evaluating service learning technology proposals was first developed in Mandarin and then translated to English for the doctoral

committee at Idaho State University. Again, every effort was made to maintain the exact meaning; however, something might have been lost or added in translation due to cultural differences.

The targeted school assigned students to classes. This meant the researcher was unable to randomly assign students into either the control or the experimental group for the study. This is a limitation because there may have been factors that influenced the study unbeknownst to the researcher. However, since all participants had qualified for college admission and were within the same major focus of study, it was assumed that the two groups were similar in the important elements of academic capability and achievement.

Interaction among students in the experimental and control groups was feasible. The participants worked together in the computer lab and interacted with one another on a daily basis. The researcher was aware that this interaction might influence both groups' outcomes, but participants were asked to not collaborate on the formation of their proposals. Additionally, subjects in the study were volunteers who could withdraw from the research at any time. Because of this element, the participants who finished the study might not be true representatives of the overall student population.

Last, the expert review panel that validated the proposal rubric was drawn from the faculty of colleges in Taipei and might not truly represent universally accepted expert opinion. These limitations mean that conclusions must be limited and carefully drawn.

Delimitations

Delimitations are described as "what the researcher is not going to do" (Leedy & Ormrod, 2005, p. 332). This also means that delimitations may focus only on a narrow scope of the research (Creswell, 2003). These delimitations might affect the external validity, or generalizability, concerning the results of the study. Based on Trochim (2000), people, places, and times are the three major threats to external validity.

To assure manageability of the collected data, survey instruments used only multiple-choice items and did not include open-ended responses. This delimitation means that the researcher might not have discovered the entire range of participants' attitudes toward the project proposal.

The sample population selected for this study was limited to senior students enrolled in an IT course offered by the Department of Information Technology and Mobile Communication of Taipei College of Maritime Technology during the spring 2016 semester. Thus, generalization of the results of this study to the entire population of students in Taiwan cannot be made, and generalization to other age groups may not be warranted.

This study was further delimited by the duration of time during which it was carried out, which was two hours per week for eight weeks. Thus, all service learning content needed to be delivered within 16 hours. Normally, this content is delivered over the entire term of 16 weeks. However, both the researcher's access to the target population and the scheduling instituted by the college prevented a longer implementation, so the duration may affect the external validity.

There was no standard rubric currently used to measure effective learning for an IT service-learning project. This study used the Delphi Method to develop a rubric to evaluate the effectiveness of the IT service-learning instructional module. Hence, the findings of this study were based on performances as measured by the researcher-designed assessment instrument and are delimited to it.

The findings of the study were limited to the content taught via the instructional treatment methods. While the researcher used the guidelines for the service-learning project recommended by the Taiwan Minister of Education's (MOE) profiles, the instruction did not strictly adhere to all the parameters outlined by the MOE. Conclusions drawn from this study must respect the narrow scope of the research and limit the generalizability of the results.

Definitions of Terms

The following terms are presented in alignment for this proposed research study:

1. ***ADDIE***: A generic and simplified instructional systems design (ISD) model. ADDIE is short for Analyze, Design, Develop, Implement, and Evaluate. (Strickland, 2006).
2. ***Delphi Method***: A way to collect information that relies on expert judgments that are used to organize, guide, and inspire the experts' group decision-making process. The process begins with a document being given to experts who have special experience and knowledge about the subject at hand for evaluation and feedback. The document is then revised based on the feedback until the differences among the experts are resolved; the process often involves multiple revisions (Delbecq, Van de Ven, & Gustafson, 1975).

3. ***Information Technology Service-Learning-Based (ITSLB) multimedia module***: The researcher is defining this as multimedia module for teaching about service learning through three Reusable Learning Objects.
4. ***RLOs***: Reusable Learning Objects are digital resources whose pieces, called chunks, support a specific pedagogical objective and are available for repeated use by multiple instructors (Eduworks Corporation, 2001-2005).
5. ***Service-learning***: A teaching and learning strategy that integrates meaningful community service with instruction and reflection to enrich the learning experience, teach civic responsibility, and strengthen communities (National Service-Learning Clearinghouse, 2011).
6. ***Service-Learning Technology Project Proposal (SLTPP)***: The researcher is defining this as a collaborative enterprise involving meaningful voluntary community work that uses computers and software to create a service-learning proposal to strengthen students' knowledge and skills.
7. ***Service-Learning Technology Project Proposal (SLTPP) rubric***: The researcher is defining this as a set of guidelines developed for trained graders to use to evaluate and score student service-learning project proposals.

Significance of the Study

Through the development of the SLTPP rubric, a more purposeful and unbiased measurement may be available for the IT service-learning project proposal, which is part of a national Taiwanese government initiative. This rubric, if found effective, could be used to help colleges direct IT service-learning project proposals through more objective

assessment of their students' performances and result in stronger service-learning projects.

Secondarily, this study developed an information technology service-learning (ITSLB) multimedia module which incorporated, through three RLOs, a standard project proposal design that may help shape a fully formed project design and implementation that can be standardized across various institutions' service-learning efforts. It is the researcher's hope that this study arms students with the necessary skills to complete a fully functional project proposal design that will win funding for their project from the MOE.

In summary, the findings of the current research may contribute to service-learning educators' understanding of the benefits of the Information Technology Service-Learning-Based (ITSLB) multimedia module. The study may also inform service-learning educators about the potential uses of a standardized Service-Learning Technology Project Proposal (SLTPP) rubric and be useful as a project proposal evaluation tool in their instructional environments.

CHAPTER II

Review of the Literature

The purpose of this chapter is to review the literature relating to the proposed study. To that end, the following major sections are presented: 1) Service-Learning, 2) Instructional Design, and 3) the Delphi Method.

Service-learning

Service-learning has the intent of changing both the ones who serve and those to whom the services are given (ETR Associates, 2011). This is accomplished by combining tasks with structured community interaction and connecting these to self-reflection, self-discovery, the acquisition of knowledge, and the comprehension of values (ETR Associates, 2011, para. 1).

Hu (2008) elaborated that service-learning is also an instructional model. Through programmatic activities, service-learning may help students combine academic knowledge and community needs. This not only provides students with multiple learning channels, but also helps them understand social diversity. Furthermore, Hu stated that many studies include service-learning strategies for students and have had a positive impact in developing self-esteem and self-respect, improving interpersonal skills, enhancing academic motivation and interest in learning, improving academic achievements, helping with career awareness, assisting with personal growth and development, cultivating social responsibility, and inspiring a sense of community participation. In short, learning by doing can have a major impact on the effectiveness of service-learning.

The beginning of service-learning. According to Guo (1996), service-learning began in the U.S. in the 1960s. Service-learning at both elementary and middle schools began from the tradition of serving others. In the late 1980s, the American Council on

Education officially created the philosophy and methods for service-learning by joining forces with Campus Compact and 1,000 universities and colleges. In addition, the United States Congress completed the legislative process to recognize national and community service in 1990, and service-learning began to have the backing of national law (as cited in Guo). There were two key phases in this process: 1) President George Bush signed the bill to ensure the states would offer students from preschool to university opportunities to participate in service-learning. The bill included an Elementary School Service Project, Middle and High School Service Project, a Higher Education Service Project, a Youth Service Corps Project, and a Community Service Project (as cited in Guo); and, 2) During President Clinton's term, the United States Congress amended and passed the National and Community Service Trust Act, and the Federal Government of the United States passed The Service Action Act (as cited in Guo).

A similar service concept existed in Taiwan's communities and schools in the early 1950s. However, it was called labor education and included sweeping the streets, cleaning ditches, and cutting grass (Guo, 1996). In the 1970s, social service and community service thrived in colleges through service-based societies and extra-curricular activities. Students participated in service activities after school. Some Taiwanese educators thought service-learning as it was practiced in the United States should be introduced, as it was effective and fruitful in the U.S.A. They further advocated that it should be put into formal curricular practice in order to provide greater service to society (Guo). Therefore, service-learning was introduced to Taiwan's campuses. To promote service-learning, the Common Education Committee of National Taiwan University launched the first service-learning project in a college in 1996 (Huang, 2007).

In December 1999, the Taipei Municipal Government announced the Implementation Guidelines for Promoting Service-learning at different levels of schools in Taipei. This was the first plan launched jointly by an educational and administrative body. Middle schools and higher levels of education launched service-learning in full gear. Each semester, students were supposed to participate in eight hours of service-learning, which stressed altruism, autonomy, and being educative (NYC, 2001). In 2001, those students whose service was remarkable were publicly praised. In order to encourage students to learn how to care about the community, serve others, and have the attitude and habit of serving others, the National Youth Commission (NYC) made the Implementation and Plan to Encourage Middle School Students to participate in service-learning (NYC, 2001). To achieve this goal, the NYC published a manual for service-learning projects, held learning camps for seed teachers of service-learning, and subsidized those schools that promoted service-learning; this was the beginning of government assistance for schools to promote service-learning. The Ministry of the Interior, the Taiwan Provincial Government, and the Central Personnel Administration also launched various volunteer service programs. The private sector vigorously promoted similar programs. As a result, the Volunteer Service Act was born in 2001. The NYC started to pay more attention to promoting the ideals and practices of service-learning and created the Annual Plan of Service-learning in 2003, which was the first well-planned large-scale promotion program of service-learning by a governmental body. The Ministry of Education issued the College-level Service-Learning Project on May 9, 2007, to promote service-learning in colleges. The Ministry of Education also compiled the *Reference Manual of College-Level Service-learning Courses and Activities* at the end of October 2007 and sent copies of the manual to colleges and

universities to serve as references for them to offer courses. To encourage colleges and universities to engage in service-learning-related activities, the Ministry promulgated the *Guidelines of Offering Service-learning-Related Courses in College Subsidized by the Ministry of Education* (MOE, 2010). There were 125 colleges and universities that set up units to promote service-learning (MOE, 2010). The service-learning courses were included in the formal curriculum in 120 colleges and universities.

The MOE (2010) set the evaluation standards for effectiveness, and these encouraged schools to include service-learning for formal course credits, including supervising the way schools promoted service-learning, and stipulated the key points of implementation. The format also included the program standards for evaluation (for instance, visiting private schools regarding student affairs and counseling), which served as performance indicators for university accreditation, general education accreditation, school affairs accreditation, and accreditation of departments and graduate schools. In addition, observation and evaluation of nationwide college students' societies and their service-learning was conducted. The evaluation of their results caused these societies to enhance or improve their service-learning, both in quality and quantity. The societies that did outstanding service-learning were publicly acknowledged and rewarded.

The major missing component within all of these endeavors has been the lack of standards for which goals and objectives were aligned and consistently measured. These factors have resulted in implementations that have had wide variance in their administration, oversight, and evaluation both within and across institutions.

Types of service-learning. Service-learning can be defined as a combination of the action of service and the experience and/or process of learning (Hu, 2008). It is

expected that students learning from the process of service gain a better understanding of their educational experience. Just as Dewey (as cited in Warde, 1960) mentioned, students retain information best when “learning by doing” (p. 1). Therefore, offering service-related courses at schools may cause students to care about their communities and test and verify what they are learning. As the school is interacting with the community reciprocally, it provides support through student resources. Students may have opportunities to grow and get to know their society better. As for reflection, this process, which includes periodic writing about their experiences, helps students use what they have learned from the community activities and course work, in order to reflect upon their experiences and internalize their knowledge during and after the process of service. This also enables learners to think about the value of what they have learned and what they can improve (Hu, 2008).

In 1999, through the National Student Service-Learning and Community Service Survey, the National Center for Education Statistics related what types of actions should be incorporated, including these four attributes: 1) be arranged to coordinate with the subject or course; 2) have a specific description of the goal of learning; 3) discuss what the community really needs; and 4) devise reports and activities for service-learning.

The National Youth Commission (2001), through Executive Yuan’s leadership, indicated service-learning should be manifested through teaching methods in courses, instilling a sense of joy for the student through the experience, cultivating a love and concern for society, and encouraging application of service-learning through hands-on service to test and verify what was learned.

S. Y. Lin (2001) summarized the types of service-learning as collaborative,

reciprocal, diverse, formal, and embracing aspects of social justice. These five elements are the essential positive results of service-learning outcomes as they relate to education, and they serve as important tools for educators to implement in their classrooms.

The purpose of service-learning is to provide students with hands-on experience with real world application. The integration of hands-on service and knowledge contributes to the students' self-growth and educational experiences. As students provide service to the community, they meet the potential needs of the public, bringing the school and the community closer together. As the service providers and the ones who benefit from the process of shared interactions, students will eventually improve the environment they inhabit, and create a society that contains more elements of social justice (Hu, 2008).

There are four main tenets of service-learning promoted by the National Youth Commission (2001):

1. Provide the younger population with diverse service channels.
2. Help youth establish values and a life philosophy.
3. Bridge the gap between school and community.
4. Vitalize volunteer groups and contribute to the development of a civil society. (National Youth Commission, 2001, para. 2)

These four objectives are very general guidelines and give wide latitude as to how they could be implemented. They illustrate the application of these ideas as they pertain to the process of service-learning.

Service-learning is modeled after experiential education (Service-Learning and Experiential Education, 2012, para. 1). It is an action plan that through planned activities

and structured processes of reflection, knowledge, and interaction, works to allow students to apply information they have learned in a classroom to a service project. This can help students reflect on their behavior during the service process, deepen their understanding, and increase their ability to think and discriminate, all of which meet the needs of those who are being served.

There are six types of service-learning programs in Taiwan that are essential. They are described as: 1) regular service provided by student clubs; 2) classified services arranged by the school; 3) unified service as dictated by the school; 4) the art and culture performances as arranged by the school; 5) intermediary service provided by the school; and, 6) the independent arrangement of services by the students (Hu, 2008).

Service-learning at the college-level as prescribed by the Ministry of Education (2008) is classified into two types of implementation: The first type is service-learning integrated with student club activities. The second type is course-based and is classified into three categories: 1) the common curriculum of the school, 2) the general education courses, and 3) the professional courses. Since the Taiwanese government is moving toward course-based projects, this research study dealt primarily with this approach for a service-learning program in Taiwan.

According to course-based projects, the school designs the common curriculum and most of it consists of general education courses. The goal is to enhance students' humanistic qualities, knowledge of society, appreciation of the culture and arts, and love for the land. Most courses that relate to developing one's character belong to the category of general education.

Regarding creating courses with service learning components, Heffernan (2001) stated that this process involves reconstructing material around existing courses, through an examination of a service-learning curriculum. If faculty explore and incorporate the appropriate models of service learning into their courses, they can enhance the educational experience of students (Heffernan, 2001). Heffernan's course design offers a unique approach to service-learning, which allows students to acquire both intellectual and real-world experience while helping the community. Service-learning is a method of teaching/learning, but it is also a philosophy of reciprocity emphasizing the objectives of service and learning, which are equally important, as well as enhancing the effect of completed targets for service providers and the people they serve.

The process of service-learning is an educational practice that introduces new and dynamic ways of instruction. It often differs from traditional teaching methods in that it enhances learning through hands-on application within the community. It also offers new and vibrant ways for students to acquire knowledge, solve problems, analyze material, and think for themselves.

There are two major approaches to consider according to the National Youth Leadership Council in America (2012). First, the instructor should list the objectives for the course. Then, the instructor should think about what kinds of service-learning can be applied. These types of service-learning relate to knowledge, skills, and affection for the targeted subjects in order to achieve the objectives. The second approach involves choosing the right service-learning program to enact. In this design, the program objectives are considered and combined for the course in order to achieve a successful outcome.

Functions of service-learning. Shen (1997) indicates five functions of service-learning: 1) obtain self-satisfaction; 2) become a coordinator of services; 3) gain the experience of cooperation; 4) learn about other aspects of society; and 5) contribute to the transformation of the school. All of these functions provide an understanding of service-learning while assisting the community.

In relation to the first function (obtaining self-satisfaction), when asked to do something important, most youths take the task seriously and do it with a sense of earnestness (Shen, 1997). If the service they do will make a difference, they will obtain self-satisfaction and win the respect of others.

For the second function of service-learning, acting as the coordinator of services, the learners are allowed to become planners, executors, and leaders; thus, they will serve as valuable and capable resources. If youths are given a purpose through service-learning, they have a reason to make the world a better place.

The third function involves gaining the experience of cooperation. Often times, service-learning is not merely an individual's understanding, but an opportunity to learn to work together and receive everyone's contributions in a project. This helps participants gain valuable expertise when dealing with others. These are skills students can use in the real world as well as enriching their individual lives.

According to Shen (1997), the fourth function of service-learning involves learning about society. Students are presented with an unfamiliar side of their culture, such as the elderly in a nursing home, the homeless in a shelter, or the physically challenged. This provides students the experience of helping a diverse population. They

see individuals outside of common stereotypes and are exposed to a side of society they may never have previously encountered.

The fifth function of service-learning is the transformation of schools through service and experience. Service-learning might be the catalyst to help change education and provide the opportunity for students to positively affect the world around them. All five of these functions can add to the development of individuals and communities through incorporating service-learning into formal courses of study (Shen, 1997).

Gao and Wu (2003) argued that the integration of service-learning is a powerful tool and beneficial service for students, the school, and the community. It is an experiential service that transcends the technology field and enhances the theoretical courses; therefore, service-learning should not be regarded as an extra burden. From the students' perspective, service-learning might contribute to their ability to reflect and think critically (Gao & Wu, 2003). From the school's perspective, service-learning might change the teacher-student relationship. Students become learning partners who take the initiative, instead of passive knowledge receivers. As students and teachers interact, the atmosphere becomes more open and active and the school becomes an environment of growth and care. Likewise, the school may receive resources and support from the community. From the society's perspective, students provide direct service to the community to help solve real problems and bring new energy and thinking to the community (Billig, 2002).

The process of service-learning. An essential part of service-learning is the process of coordinating students in service activities in the community. Relating to this topic, Hu (2008) stressed that well-designed service-learning activities will be different in

the process and steps, the length of promotion time, the number of participants, the scale of activities, and the resources within the project. According to Hu, there are four major phases: 1) preparation, 2) service/action, 3) reflection, and 4) celebration.

Hu (2008) described preparation as the first step in formulating the tasks the service will include. One key charge is the incorporation of content with the needs of the targeted community/organization. A second key task is the development of the service plan as it pertains to teachers, students, and the community/organization. A third important component is the teacher serving as director of the service activity, the provider of the training, and the liaison between the office of service-learning and the community/organization (Hu).

The second phase, service/action, involves the implementation of the service-learning (Hu, 2008). Student teams are involved in meaningful, hands-on service to solve the targeted problem. This may also focus extra attention on the process needed to implement the project in the community. The second emphasis is the way in which the teacher leads the students to move forward in understanding and actions, while being mindful of the diversity of services possible for students with different abilities. This means students with different skills can first participate with a team, and then little by little, work as individuals to enhance their particular skills (Hu, 2008).

The third phase is reflection, which, according to Hu (2008), could be in the form of structured reflection activities, such as writing journals about their service, examining study books concerning the people they serve, conducting group discussions, writing reports, and other reflection building activities. Questions that may emerge are, “What service did I do?” or “What meaning and learning did the experience give me?” or even,

"What should I do to apply what I learned in future activities?" These key questions are essential in understanding the reason behind the service-learning endeavors. These tasks also help the students make a valuable connection to the communities they work with, as well as reflect upon their experiences as a whole and realize the significance behind their service-learning projects (Hu).

Hu's (2008) final stage involves celebration. This consists of two key tasks: The first is a process of sharing, which allows students and teachers to communicate their experiences about what they have gained from their work. The second involves having fun together as a way of celebrating with the targeted community. This may involve receiving certificates of acknowledgment, verbal and written thank you communications, badges, as well as acknowledging the hard work teammates and teachers have accomplished (Hu).

Service-learning goals. According to the *College Service-learning Programs and Activities Reference Manual* edited by the Taiwanese Ministry of Education (2008), the goal of service-learning is to provide students with integrated practical experience using the appropriate knowledge and skills acquired. Several researchers have identified service-learning goals.

Eyler and Giles (1997) found that service-learning projects are designed to reach the ideal of civic literacy and should contain the following elements: "1) Value - *I ought to do it*; 2) Knowledge - *I know what I ought to do and why*, 3) Skills - *I know how to do it*, 4) Efficacy - *I can do it and it will make a difference*, and 5) Commitment – *I must and will do it"* (pp. 211-254). Eyler and Giles used the learner's perspective in describing service-learning goals.

From the aspect of curriculum goal design, Hong (2010) further synthesized and analyzed elements based upon learning goals as: “1) cognitive: understanding that links exist between service-learning and conventional learning; 2) attitude: respect for diversity, helping behavior, and social responsibility; and, 3) skill: communication, leadership, teamwork, problem solving, and social skills” (pp. 15-17). Hong’s description of service-learning goals specified societal elements.

Dary, Prueter, Grinde, Grobschmidt, and Evers (2006), in *A Guide to Implementing Quality Academic Service-Learning*, stressed there are four goals aligned with academic service-learning: “1) recruiting and retaining quality teachers, 2) innovation that works, 3) safe and respectful schools, and 4) accountability for results” (p. 11). This perspective highlights the practical aspect of service-learning goals. These guidelines allow researchers to gather and implement new information in their courses.

Service-learning standards. Billig (2004) proposed that research confirms high quality service-learning experiences that strengthen people, schools, and communities; therefore, it is important to establish standards for service-learning. This is supported by the *Recruitment Brochure of the Year 2011* (Ministry of Education, 2011), which indicates every college that would like to apply for a service-learning project needed to submit a plan for approval to the Taiwanese Ministry of Education (MOE). The MOE then invited scholars and experts in the related fields to be judges. The key points of evaluation were: 1) Service values of the group and organizational teamwork; 2) the degree of understanding of their clients; 3) the content of the service program and the way its activities are recorded; 4) the plan for self-growth of the volunteers; and 5) the follow-up plans for group service.

The Youth Commission's Subsidy Guidelines for Youth Volunteer Service (2008) further support this approach in listing six aspects that should be presented in any future service-learning projects. These consist of:

1. Creativity, outlining and implementation within service planning
2. The ability to integrate the use of community resources
3. Teamwork and operations
4. Service-learning effectiveness
5. The target of change and its impact
6. Service continuity and development (Youth Commission, 2008, p. 3)

Huang (1991) defined integration as the organization of two or more different things related to each other into a meaningful whole. Students also need to be aware that learning takes place in a social and situational environment (Zheng, 2000). Therefore, the planning of instruction integrated with service-learning projects will allow teachers to focus on two kinds of curriculum integration: 1) the content integration of information projects in academic institutions, and 2) the integration of these experiences with application of information technology in a service-learning internship.

In 2008, the National Youth Leadership Council proposed the service-learning field release evidence-based standards and accompanying indicators for K-12 practitioners to ensure high-quality service-learning activities. Taiwan has not established its own standards for the entire education system, which includes elementary, secondary, and higher education. Because of this, service-learning standards in the United States (see Appendix A) are used to fill the gap in Taiwan's educational system in relation to service-learning.

According to Billig and Weah (2008), the service-learning standard process should involve gathering high-quality research studies in K-12 service-learning. These studies should be summarized from the broader field of education to the related topic, convening experts to draft the initial set of standards and indicators. Service-learning can be used to draw together youths, teachers, schools, and community-based organization administrators in order to create various projects for the betterment of the community. The purpose would be to facilitate panels in implementing standards and indicators to ensure that service-learning projects both benefit and improve the communities. Likewise, Taiwan could benefit from these service-learning standards because service-learning would aid government programs and the educational system, in general, as an example for both the rigor in establishing standards and the process for validating them.

Service-learning measurement. The measurement of service-learning is a valuable component of the research process. According to Steinberg, Bringle, and Williams (2010), data collection is an essential part of measuring service-learning experiences. This can be done through classroom assessment, self-assessment, and course or program evaluations. Steinberg, Bringle, and Willliams (2010) specified that "Classroom assessment (grading) and self-assessment techniques include student quizzes and tests, homework, reflection activities, and faculty teaching portfolios" (p. 25). Data collection can be the tool through which accurate measurement of service-learning can be possible. Through this mode, evaluation of data occurs by examining the information that has been collected. Afterward, an appropriate analysis must be made to understand the meaning of this data.

When conducting and measuring research on service-learning, researchers should be aware of the various procedures that are utilized in both qualitative and quantitative methods of evaluation. However, it is important to recognize that whatever method is used in analyzing the research, no one method is foolproof. This means careful attention must be paid when triangulating the results of data collected; therefore, researchers must evaluate their findings prudently in order to obtain meaningful results (Steinberg, Bringle, & Williams, 2010).

Laird (2008) conducted a service-learning outcomes attitude study that involved both middle and high school students ($N = 100$). Laird established that, when students were divided into either *Learn* or *Serve* groups, there was a statistically significant difference in their attitude toward the projects on which they were working. The students in the *Serve* groups had a statistically significant improvement in their attitude ($p = .05$) upon completion of their service-learning project. The study found that the attitudes in both groups toward the experiment were positive, but the attitudes in the *Serve* group were slightly more positive. In general, Laird found that attitudes played a significant role in the success of certain service-learning projects among high school student participants.

Hu (2008) considered service-learning from a holistic educational approach. This approach covered several aspects, such as students' academic intelligence, critical thinking, and self-concepts. Hu posited that the educational atmosphere and the relationship between schools and communities also could be improved through service-learning.

Hu (2008) believed that service-learning could promote interpersonal growth, increase participation and motivation, and encourage students to actively ask questions in

a classroom setting. This could improve academic performance, enhance students' sense of social responsibility, and strengthen the use of learning and problem-solving skills. This is important if the student is to be successful in retaining the practical application of service-learning.

Another result of engaging students in service-learning is the acquisition of new experiences that are directly related to increasing their content knowledge (Hu, 2008). This may allow students to not only enhance their personal development, but also to promote academic growth.

In addition, Astin, Vogelgesang, Ikeda, and Yee (2000) asserted that service-learning may bring a change in teacher-student relationships. Teachers act as both guides and facilitators, while students become active partners in the learning environment. This is essential, because students are no longer passive recipients of knowledge, but serve as active participants in the learning process. Environment plays an important role in the instruction of students and ways in which they relate to teachers in the classroom. In relation to student-teacher interaction, service can be both an object and a stimulus when referring to learning expectations. This means that attitudes must be established as an applicable form of learning experience (Astin, Vogelgesang, Ikeda, & Yee, 2000).

In relation to social aspects, students who participate in community service may find greater meaning by exploring, understanding, and solving social problems that affect their immediate environment (Hu, 2008). This, in turn, may lead to students becoming responsible citizens in the future. Service-learning can be viewed in the "giving" and "accepting" forms as a mutually beneficial relationship, which can establish a learning community for positive growth and vitalization (Hu, 2008).

Service-learning courses should be based on projects relating to community service that are also tied to curriculum. This ensures their focus will be civic in nature and center upon affective educational goals, attitudes, and values pertaining to the community. The Taiwan Ministry of Education (2008) published the *Post-Secondary Schools Service-learning Program*, which expressed the importance of promoting service-learning among various college students that, in turn, allows them to establish positive attitudes and gain experience for future employment.

Markus, Howard, and King (1993) surveyed several groups of students and discovered that attitudes greatly influenced the outcome of their service-learning. The authors collected data from undergraduate learners in a political science class which made discussion and service-learning a vital part of the course material. The researchers discovered that students who applied the principles from their service-learning to other social issues had a higher awareness of societal problems. Overall, classroom learning and grades increased considerably, because the students' participation was pertinent to community service. Data before and after the survey found that learners had a greater effect in the community, due to a focus on how to improve the situation rather than on the problem itself (Markus, Howard, & King, 1993).

Astin, Vogelgesang, Ikeda, and Yee (2000) stated that there are specific outcomes that demonstrated significant effects in the service-learning process. One measures academic performance, which includes GPA, writing skills, and critical thinking skills. This ensures that students focus on their academic accomplishment while performing their service-learning. Another involves values, with an emphasis on commitment to activism and to promoting racial understanding. Another outcome is self-efficacy

leadership, which focuses on self-rated leadership ability and interpersonal skills. Without these, the students may have difficulty in social operations during their service-learning. The final measure focused on the choice of a service career and plans to participate in service after college (Astin, Vogelgesang, Ikeda, & Yee).

Service-learning with technology. In relation to technology, service-learning can be a dynamic method that can improve program design in a number of disciplines (Davi, Frydenberg, & Gulati, 2007). Many Management Information courses are firmly based on a skill-value system (Benbasat, Dexter, & Mantha, 1980). Service-learning can be employed in a variety of ways, such as improving and analyzing current business practices, strengthening and re-enforcing experiential activity in the classroom, as well as widening the skill base of students through a service-learning model (McCarthy & Tucker, 1999).

According to Cheng (2008), students who performed service-learning had an increase in their problem-solving and analytical skills. Cheng also concluded that students who participated in service-learning were more likely to develop strong traits of responsibility, leadership, and adaptation. By incorporating service-learning with technology courses, students can gain technological skills with various forms of media, as well as the hands-on application of skills in relation to service-learning.

Y. X. Lin (2005) proposed that service-learning can bridge the gap between digital technology and educational advancement. Due to location, many people in the Taiwanese countryside do not have the same educational opportunities as individuals residing in more developed urban areas. Lin suggested that students could bridge the digital gap by traveling to more rural areas and bringing educational courses to people

without access. This could be a positive situation for students who perform service-learning while bringing digital knowledge to isolated populations. It would also be viewed as positive for the targeted communities by improving the quality of life in these locations.

Lin (2006) wrote that learning should be from the inside to the outside, so learners must actively participate in the process. The role of the teacher changes from directors to supporters, or guides, who apply the team learning approach to help students develop their real potential. This point of view on constructivism supports the integration of instructional technology (IT) projects and service-learning programs, because projects are based on teamwork, and service-learning provides the learning path and motivation for students to actively participate.

According to Clark's (1998) Commitment and Necessary Effort (CaNE) model of work motivation, students can be motivated when they are given incentives to learn and complete their work. Therefore, the promotion of service-learning should attend to the learners' intrinsic motivation and offer incentives if necessary. Otherwise, students may not be willing to participate in service-learning, or they may give up halfway through, which results in the program's failure.

Teachers may apply Clark's (1998) approach by conducting interviews of participants. Individuals' responses can be analyzed and then teachers (or employers) can use this information to inform the instructional activities based on Keller's (1984) ARCS motivation model. Teachers may develop the theoretical and practical strategies and methods of a road map that would specify how the service-learning participants could be encouraged to engage in an organized fashion with the community. In the process,

students would extend their content knowledge from a specific course through teacher-guidance and cooperative teamwork. With this purposeful design, these students may continue to inspire and influence future students to become lifelong volunteers.

Instructional Design

The subject of Instructional Design (ID) is focused on instructional theory and learning theory to enhance the educational experiences of both teachers and students (Reigeluth, 1999). This process enhances learning materials under classroom goals through an efficient delivery system that meets the needs of students, and allows teachers to evaluate and improve activities and assessment. The systematic process of ID is often used to develop academic curricula and training programs within a discipline.

Gustafson and Branch (1997) give several principles of instructional design aligned with educational methods:

1. Instructional design is learner centered.
2. Instructional design is goal oriented.
3. Instructional design focuses on meaningful performance.
4. Instructional design assumes outcomes can be measured in a reliable and valid way.
5. Instructional design is empirical, iterative, self-correcting.
6. Instructional design typically is a team effort. (pp. 13-15)

Gustafson and Branch noted that aligning instructional design with educational methods has become more common among institutions that train their own personnel in order to make certain that their training is both effective and relevant. The authors specifically

noted that the use of instructional design “is growing in colleges and schools …as they become involved in distance learning programs” (p. 14).

Dick, Carey, and Carey (2009) developed a seminal ID model, which is a 10-step iterative, interactive process. In addition, Morrison, Ross, and Kemp (2007) developed a nine-step ID process for content to be manifested through a "comprehensive instructional design plan" (p. 7) that enables the information to be clearly inspected. The Morrison, Ross, and Kemp (2007) model is learner-centered and depicts an ID environment that operates as a continuous cycle. Within the context of ID, Greer (1992) introduced a 10-step ID Project Management Model that includes the following steps: (1) determine the project scope, (2) organize the project, (3) gather information, (4) develop the blueprint, (5) create draft materials, (6) test draft materials, (7) produce master materials, (8) reproduce, (9) distribute, and (10) evaluate.

All ID models help developers focus on the learning content and establish a vision that breaks the materials into manageable chunks of instruction. In general, ID models focus on the design and development of learning content, and not on larger administrative or management issues, such as budgets and staffing. These purposeful, coordinated approaches are imperative to the service-learning project proposed by this researcher, particularly as embodied in student-centered, intrinsic, action-oriented community outreach. It is also why the researcher used the ADDIE instructional design approach, since it appears to be the foundational plan from which the other models were based.

ADDIE instructional design model. The Analysis, Design, Develop, Implement, and Evaluate (ADDIE) model is one of the most widely used systematic processes in the instructional design community (Gustafson & Branch, 1997). The ADDIE model provides

a generic and systematic framework to instructional design that can be applied to any learning solution (Lin, J., 2009). Most of the currently used instructional design models are variants of the ADDIE models (Lin, J.). Strickland (2006) explained that "the five elements of ADDIE are ongoing activities that continue throughout the life of an instructional design endeavor; the five elements work like a loop with formative evaluation occurring within each and among all phases" (para. 1).

In the Analyze phase, the instructional problem is clarified, the goals and objectives are established, and the learning environment and learner characteristics are identified. Based on this careful analysis, the Design phase involves the instructional strategies, task analysis, media choices, and instructional materials development. This process concludes with a field test of the prototype, including assessment protocols (Strickland, 2006). In the Develop phase, materials are produced according to decisions made during the previous phase (Design). The entire instructional plan is created, including all facets of preparation for implementation (Strickland, 2006).

The Implement phase requires that the product be put into full production, including any training for instructors in delivering the product. This point means that research studies using the ADDIE instructional design model should include a pilot implementation; i.e., the first roll-out should be with a targeted participant sample (Strickland, 2006).

The Evaluate phase, as indicated earlier, is present in each stage of the instructional design process (Strickland, 2006). In addition, evaluation should take place regarding proposed research questions, and all data collected should be analyzed and reported.

Multimedia Learning

Wegerif's (2002) research focused on three primary roles of the computer in the learning experience: The computer as tutor, the computer as a mind tool, and the computer as a sustainer for reflection and conversation. These are centered upon using the computer as an interactive form of technological education.

Pea (1991) defined multimedia as a computer application, often interactive, so that various media elements such as text, graphics, video, animation, and sound could be integrated into the application. Bagui (1998) indicated there are four distinct features concerning a multimedia learning protocol:

1. The combination of multimedia and hypermedia information blocks. According to information management theory (Afifi & Weiner, 2004), it is easier and faster for a person to process and input information into short-term memory if the information has been presented in a multimedia and hypermedia information block.
2. Interactive multimedia serves as a means of enhancing student learning. The interaction can promote learning achievement, learning motivation, and reinforce learning retention.
3. Multimedia can increase the flexibility of learning. This includes multimedia learning and teaching systems that do not require a time limit. The effects of this process can take care of individual learning differences in the learning environment.
4. Multimedia and hypermedia can enable teachers to use more group-based teaching. Multimedia makes it easier for teachers to guide students in

> discovery-based learning, to encourage more investment in their own learning, and to strengthen the transfer of information (pp. 3-18).

All four of these features constitute a learning environment in which multimedia can be used to aid in students' understanding of educational concepts.

Mayer (2001) compared lessons that presented content with a text-based format to lessons that presented content with text and relevant visuals. He proposed a multimedia principle: "Students learn better from words and pictures than from words alone" (p. 63). Mayer (2002) stressed that multimedia learning occurs when the recipient builds a mental representation from words and pictures. This definition is broad enough to include book-based environments consisting of text and illustrations, computer-based environments consisting of narration and animation, and virtual game environments consisting of interactive speech and animated micro-worlds.

Clark and Mayer (2002) also contended that rich media could improve learning if used in ways that promote effective cognitive processing. These authors defined rich media as learning products that incorporate high-end media such as video, animation, sound, and simulation. They add that interpreting visual and auditory information significantly contributed to understanding how the cognitive processes can affect learning. Practitioners with a background in multimedia learning can critically analyze multimedia components that can lead to clarity rather than an overload of cognitive stimulation that can hinder learning.

In addition, Bernard et al. (2004) discovered that students who were engaged in their coursework were motivated to attain higher levels than learners who were not as involved. The study found evidence that multimedia instruction played a key role in the

learning experience. Zheng (2008) and Astleither and Hufnagl (2003) presented evidence that multimedia instruction could motivate, spark a student's interest, and if accessible at any place or any time, could improve conventional learning methods. To increase this engagement, Liu, Toprac, and Yuen (2009) identified the following five factors as contributing to intrinsic motivation: (1) problem solving, (2) having fun or playing, (3) information processing, (4) self-control or voluntary acting, and (5) socializing.

Another example of the application of digital technology is in educational instruction. This can be extended from a traditional one-way form to a multimedia two-way form of instruction. In light of this, it is also important to remember that students have multiple forms of intelligence. Multimedia can be used in inventive ways for instructing. When multimedia technology is used in computer-assisted instruction, it integrates text, audio, and video, and is designed to help teachers include diversity in communication, thereby positively impacting learners' motivation and interest.

According to Paivio's (1986) theory of dual-display, a language management system and an image management system promote more effective human memory in the process of learning. In Paivio's theory, teacher-centered learning will gradually be transformed into learner-centered knowledge progression, and the learners can initiate a variety of media materials leading to autonomous learning (Paivio, 1986). Multimedia instruction supports the theory of dual-display, because, instead of a traditional classroom where there is one form of learning, a variety of elements are used that aid in a student's learning. These principles were applied to the researcher's study as it related to the design of a learning rubric and a multimedia instructional module for on-line use in the class.

Further support can be found in Nikolova (2002), who claimed students could experience authentic creativity through multimedia modules integrated into the learning process. This author pointed out that the process of creating learning materials is most beneficial in regard to students' attitudes and actions. Therefore, the level of creativity that teachers enact is crucial to the projects they have their students undertake. This means that students who are given the freedom to use more creativity in their projects gain a better understanding of their educational goals. If students are properly motivated through multimedia-based modules, then the educational experience will be more significant than merely using the traditional instructional method.

Huang (2005) asserted that "The development of a multimedia module consists of five phases: (1) understand the learning problem and the user's needs; (2) design the content to harness the enabling technologies; (3) build multimedia materials with web style standards and human factors principles; (4) to use test results; and (5) evaluate and improve design" (p. 28). Huang's phases are similar to the Analysis, Design, Develop, Implement, and Evaluate (ADDIE) ID process.

A study by Lim, Chong, Jailani, and Spahat (2005) pertained to an electronic module (e-module), which was constructed based on the ADDIE model. Its development was strongly influenced by previous step-based research. Instructional design was a key component of the e-module and was used to interface information, screen presentation, and various interactive multimedia elements found within the e-module program. According to Lim et al. (2005), "The results of the study revealed that the e-module produced conforms to the requirements by students in terms of contents, teaching strategies, the teaching presentation and software application" (p. 32). The research of Lim et al. is significant for

this study, because it demonstrates the benefits of developing learning content based on ADDIE and supports the plan to create and implement a service-learning multimedia module to test student retention and content acquisition in service-learning.

Wang (2006) employed the ADDIE model to explore the use of instructional technology on cosmetology college students in southeastern Idaho. The researcher applied Cronbach's alpha to measure the performance assessment and achievement of students in this study. The results of the study showed that multimedia served as a valuable vehicle for increasing knowledge and participation of the students, and the results point to ways for teachers to apply these teaching techniques and tools for future cosmetology students. This study is relevant, because it showed the effectiveness of the ADDIE model and the importance of incorporating multimedia methods in the classroom to enhance the educational experience.

Shibley, Amaral, Shank, and Shibley (2005) compiled a team of six professionals who spent 1,000 man-hours and 18 months developing a General Chemistry course that integrated on-line and face-to-face instruction and did away with the traditional lecture format. The researchers applied the ADDIE model to improve the academic success of students. According to Shibley et al. (2005), employing the ADDIE model allowed the researchers to provide a step-by-step process that was well organized and well documented.

Peterson (2003) submitted that the ADDIE model was particularly effective in providing developers with a generic, systematic framework that was easy to use and applicable to a variety of settings. Peterson used the ADDIE model in two ways in a master's level instructional design course: First, as a framework for the development of the

course, and later as a process for the creation of multimedia projects. The ADDIE model presented users with an approach to instructional design that incorporated an iterative process complete with essential steps for the development of an effective course. Peterson discovered that employing the ADDIE model in the development of a program could assist developers in instituting a learner-centered approach rather than a teacher-centered approach, making it more applicable and meaningful for learners.

The ADDIE model is a useful, simple framework for instructional design. The process can be applied in a variety of settings because of its systematic and generic structure. A comprehensive iterative process like the ADDIE model provides designers and instructors with an effective method that can be used for a wide range of courses and programs that are multimedia-oriented. Therefore, the researcher used the ADDIE model for this study.

Delphi Method

The Delphi Method is a research approach adopted by researchers to reach final conclusions about a specific topic by using a series of surveys, in which a panel of experts are invited to express and exchange their opinions anonymously (Okoli & Pawlowski, 2004). This approach can be utilized especially when the data is inadequate or the situation is unknown. Experts are invited to offer their professional expertise, experiences, and opinions to reach consensus. This method is an efficient tool in terms of analyzing complex issues, evaluating the current situation, enhancing the quality of policy, and diagnosing business and educational transformation.

The modern Delphi Method was created by Dalkey of the RAND Corporation as part of a military project in the 1950s (Dalkey & Helmer, 1963). The goal was to combat

Soviet intelligence during the Cold War and create a method of development to find military targeting systems. However, the Delphi Method has been applied to various forms of academic research that are currently used today (Dalkey & Helmer). The Delphi Method is a way of consensus building that allows its members to individually conduct evaluation without interacting face-to-face (Turoff & Linstone, 2002). Researchers who adopt this research method invite experts to provide professional opinions leading to consensus on a topic, method, or assessment. It has become one of the most used methods to forecast and evaluate complex issues (Chao, 2009).

The Delphi Method avoids the shortcomings of group meetings; instead, it advocates privacy, autonomy of opinions, and reduction of potential peer bias. Using online tools to preserve communication between the researcher and the individual panel members is an effective means for achieving this (Okoli & Pawlowski, 2004). The participants can express their opinions without any pressure and in an environment where they are not interrupted. Email is an accessible tool for sending the Delphi survey to individual experts on the panel since it can be sent as an attachment and then returned via the reply mode within the recipient's browser interface. Using the Internet also affords the possibility of online survey formats for interacting within the Delphi evaluation; again, the anonymity can be preserved through individual submissions directly to the researcher.

Validity. Gall, Gall, and Borg (2003) submitted that face validity is a component of content validity. It refers to the degree that respondents judge that the items of an assessment instrument are appropriate to the targeted construct and objectives. It is commonly thought to measure the acceptability of the assessment instrument to users and administrators.

Colton and Covert's (2007) findings provide useful information about the degree and instruments for establishing face validity, which is often criticized as a less rigorous approach than other methods since it is a subjective analysis. In the process of conducting the Delphi evaluation, this researcher has established both face and content validity, where appropriate.

Haynes, Richard, and Kubany (1995) stated, "A definition of content validity is the degree to which elements of an assessment instrument are relevant to and representative of the targeted construct for a particular assessment purpose". Colton and Covert (2007) explained content validity as the degree to which an instrument is representative of the topic and process being investigated. Content validity typically is determined systematically by content experts who define in precise terms the domain of the specific content the test is assumed to represent and then determine how well that content is sampled by the test items. A test does not need to cover all the content in a given course of study for students' scores to be content-valid, but it must cover a representative sample for the content domain. Colton and Covert also described how to obtain evidence of content validity from individuals with expertise in the subject matter being examined: A bank of items is created and content experts review and rank the items they believe are most reflective of the topic.

Hatcher and Colton (2007) used Human Resource Development (HRD)-related material in their research and demonstrated the effectiveness of web-based content and e-learning by applying Delphi techniques. The researchers conducted a study that involved the Delphi Method and ways it can be applied to content validity research. The methodology used in this study incorporated statistical data with the Delphi Method of

inquiry. The findings supported that using the Delphi Method could shape a valid instrument. Second, they discovered that Internet, web-based training could be used as a vehicle for effective education. Specifically, they found that students who received training from e-learning had more advantages in completing their education, regardless of their diverse backgrounds or geographical locations. Because of the Delphi process, assessment of the content validity could be established. Therefore, the Delphi Method may be applied as an incorporating process when using within a content validity approach.

Inter-rater reliability methods. One way to evaluate the objectivity of multiple graders is through an inter-rater reliability method. According to Colton and Covert (2007), the inter-rater reliability method is a procedure of analysis and interpretation that can be applied to various forms of data. For example, when an individual conducts a survey or study, more than one observer should interpret the data and/or findings to increase objectivity. This means that the interpretation of data is not left to one individual, but instead ensures that two or more individuals will analyze the findings. Another requirement of the inter-rater reliability method is that it involves the construction of a questionnaire or rubric that is based on an objective line of reasoning. This ensures that the graders are basing their judgments on the same criteria, thus creating a valid method of inter-rater reliability as it applies to the study and its findings.

To see how the inter-rater reliability method has been applied in the past, this researcher reviewed a study in the nursing field. The field of nursing has always had the need to diagnose and treat illness. To create a better method of evaluation, Fehring (1987) constructed the Methods to Validate Nursing Diagnoses, a consistent system of

evaluation for practicing clinical nurses. This method consists of data collection about a medical condition, which then requires two evaluators to assess the information gathered to determine its accuracy. This also involves the use of the inter-rater reliability method to allow the data to be accurately interpreted according to an expert created scoring system and to have valid results. S. Y. Lin (2003) developed a concept mapping scoring system for middle school students' writing performance that consisted of instructional guidelines and information analysis. Two trained graders followed the set guidelines and the classification system. Lin explored the effects of computer-based concept mapping as a prewriting strategy for eighth-grade students. The researcher certified that the inter-rater reliability of concept map scores was sufficient. The inter-rater reliability of scoring participant examples, subtotal scores, thesis statements, attention getters, and total scores were computed. Lin observed that the inter-rater reliability among the sub-scale scores was high. Similarly, the proposed study for this dissertation set guidelines and a classification system, and then used educational experts to interpret the data by applying an inter-rater reliability method with the rubric as a means of evaluation.

After reviewing the literature related to service-learning technology projects, ADDIE instructional design, and the Delphi Method for creating expert consensus, the researcher suggests that using the Delphi Method and the ADDIE instructional design to develop RLOs for the online ITSLB multimedia module and the SLTPP rubric for evaluating service learning project proposals can meet the MOE service learning standards in Taiwan. This study therefore investigated the effectiveness of this approach.

CHAPTER III

Methodology

The purpose of this study was to design an Information Technology Service-Learning-Based (ITSLB) online multimedia module and validate a Service-Learning Technology Project Proposal (SLTPP) assessment. To complete this development and evaluation study, the researcher created Reusable Learning Objects (RLOs), the proposal guidelines, and a scoring rubric. After development, the guidelines and scoring rubric were applied to a set of collected service-learning technology project proposals (see Appendix C for consent forms of participants). Instrument evaluations were conducted to determine the extent to which the scores derived from the performance assessment were valid and reliable. After a review of the research questions and research design, this chapter is divided into three parts. Part One describes the development and validation of the ITSLB online instructional module. Part Two describes the development and validation of the SLTPP rubric. Part Three describes how the effectiveness of the online module was determined. For each part, the participants, procedures, instruments, and data collection and analysis are described.

Research Questions

The following research questions were investigated:

1. Can service-learning standards be integrated into a technology work project that leads to a performance assessment for vocational college students with respect to service-learning outcomes?
    a. Do the rationale, goals, and objectives identified for the ITSLB (Information Technology Service-Learning-Based) instruction align with the MOE (Ministry of Education) expectations for service learning?
    b. Do the learning outcomes, learning hierarchy, and learner influences identified for the ITSLB instruction align with the MOE (Ministry of Education) expectations for service learning?

   c. Do the learner characteristics profile, pedagogical considerations, learner constraints, and learning environment and delivery identified for the ITSLB instruction align with the MOE (Ministry of Education) expectations for service learning?
   d. Does the service-learning content identified for the ITSLB instruction align with the MOE (Ministry of Education) expectations for service learning?
   e. Do the project flowcharts and the project storyboards identified for the ITSLB instruction align with the MOE (Ministry of Education) expectations for service learning?

2. Does the SLTPP rubric align with the MOE standards for service-learning performance?
   a. Does the SLTPP rubric have content validity in regards to the MOE standards for service-learning, as determined through a modified Delphi Method review?
   b. Does the ITSLB curriculum have content validity in regards to the MOE standards for service-learning, as determined through a modified Delphi Method review?

3. Is there a significant difference in performance between students who learn service-learning through a multimedia-based module and those who learn service-learning through a traditional presentation of the course curriculum, as measured by a researcher-created instrument?

The ADDIE instructional design process, in conjunction with the Delphi method, was used to create the information technology service-learning (ITSLB) multimedia module). The ADDIE Analyze and Design phase products are shown in Appendix B. Using a modified Delphi method, the steps of the ADDIE process were validated by a panel of experts. Then, the study utilized the Delphi method to validate the researcher-created rubric for the student-created service-learning project proposals. In the next step, the ITSLB multimedia RLOs were applied to the on-line students in the Multimedia Design course and both those students and the face-to-face control students in the Multimedia Design course submitted their service learning technology project proposals for evaluation using the rubric. The students' scores were compared by group to determine if the ITSLB RLOs were an effective means of delivering information technology instruction in a service-learning context.

Part One: Developing and Validating the ITSLB Multimedia Module

This section describes the participants who were chosen to validate the ITSLB multimedia module. It also describes the procedures and instruments used to validate the many tasks associated with ITSLB module development. More detail concerning the development of the ITSLB multimedia module following the ADDIE instructional design process is presented in Appendix B. This part of the study captured information needed to answer Research Question 1.

Participants. One review panel was utilized in the validation of the online instructional modules. This review panel consisted of three people (two female, one male) who had expertise both in the subject matter of service-learning and in the design of college-level curriculum. Therefore, they were able to provide expert opinions on the alignment of the instructional module with the goals, standards, and objectives of the content area and MOE service learning expectations through the modified Delphi procedure. One panel member teaches in higher education in Taipei; one runs IT-related volunteer programs; and one develops volunteer activities for the community. All three have at least seven years' experience teaching in higher education, and all three have experience as volunteers with service learning projects.

Procedures. The researcher created an Information Technology Service-Learning-Based (ITSLB) multimedia module based on the ADDIE ID process by creating three RLOs. At several points during the Analyze, Design, and Develop phases of the ADDIE process, the expert panel was asked to evaluate task-based documents by completing Delphi surveys. The results of each were returned to the researcher and discussed face-to-face whenever a member had suggestions for changes. This process

was repeated until no further changes were suggested. After completing the Analyze phase on the RLOs, the Develop phase began in which the content for the RLOs was developed using the Delphi method with the same review panel for feedback on each section of content. After agreement was reached on one section, the next section was developed and given to the research panel. This process continued until all content had been developed and approved. The panel was given three to five days to evaluate each section. The researcher worked with the review panel face-to-face as necessary. When no further changes were suggested by the review panel, the content was posted to the online course by Moodle and Google blogger.

Instruments. Seven instruments were used by the review panel to validate the content for the service-learning project: Delphi Survey 1 for the Rationale, Goal, and Objectives; Delphi Survey 2 for Learning Outcomes Statement, Learning Hierarchy with/ Content Map, and Learner Influence Document; Delphi Survey 3 for Learner Characteristics Profile and Pedagogical Considerations Statement; Delphi Survey 4 for Learner Constraints Statement and Learning Environment Map and Delivery Options Statement; Delphi Survey 5 for the objectives of the Task Analysis; Delphi Survey 6 for Project Flowcharts; and, Delphi Survey 7 for Project Storyboards.

The content and purpose of the review panel input of each Delphi survey is described in Table 1; the surveys themselves are in Appendix D.

Table 1

Delphi Surveys for Developing and Validating the Online Instructional Modules

Item	Survey Content
Delphi Survey 1- Analysis phase	1. Twenty-one sub-items from three tasks: rationale, goals, and objectives 2. Review panel feedback on alignment of project goals and

Item	Survey Content
	objectives with the MOE service-learning standards
Delphi Survey 2-Analysis phase	1. Twenty-two sub-items from three tasks: Learning Outcomes Statement, Learning Hierarchy with Content Map, and Learner Influence Document 2. Review panel feedback on artifacts and their level of agreement for face validity
Delphi Survey 3-Analysis phase	1. Twenty sub-items from two tasks: Learner Characteristics Profile and Pedagogical Considerations Statement 2. Review panel evaluation of face validity for Tasks A07 and A08
Delphi Survey 4-Analysis phase	1. Twenty sub-items from two tasks: Learner Constraints Statement and Learning Environment & Delivery Options Statement 2. Review panel evaluation of face validity for Tasks A09 and A10
Delphi Survey 5-Design phase	1. Fifteen sub-items from two tasks: objectives of the task and sub-task analysis. 2. Review panel evaluation of face validity in relation to the already established and validated objectives.
Delphi Survey 6-Design phase	1. Five items related to the Project Flowcharts. 2. Review panel determination of face validity of the flowcharts in alignment with the objectives and tasks.
Delphi Survey 7-Design phase	1. Ten items related to the text, graphics, and hypertext links of the Storyboards. 2. Review panel judgment of content validity of the interface and multimedia design elements.

Data Collection and Data Analysis. After the researcher developed the Delphi survey instruments, the three-expert review panel received the Delphi survey score forms through email and face-to-face contact. The survey score form was designed with Likert scales. The format of a typical four-level Likert item consisted of Strongly Disagree, Disagree, Agree, and Strongly Agree. The raw data were collected from the review panel. These data evaluated the face and content validity of the items listed above in the seven

surveys. If one of the panel members delayed returning a survey, the researcher contacted that member and waited for the survey. All surveys were returned by email or in person.

Because item 3 of Delphi Survey 5 and items 4 and 5 of Delphi Survey 6 received low Likert ratings, the researcher made revisions to the objectives and flowcharts related to these three items and resubmitted those two surveys to the panel members. Analyze and Design documents, as well as the RLOs, were revised and resubmitted to the panel until all experts agreed the material met the criteria indicated by the Delphi survey.

Part Two: Developing and Validating the SLTPP Rubric

This section describes the development and validation of the SLTPP rubric including participants, procedures, instrument, and data collection and analysis. It also describes the validation of the final ITSLB multimedia module developed by the researcher. This part of the study captured information to answer Research Question 2.

Participants. Because of their expertise, the same review panel of subject matter experts used to evaluate the design of the ITSLP multimedia module also evaluated the rubric used to assess the student Service-Learning Technology Project Proposals (SLTPP) and the final ITSLB multimedia module. One member was from the academic community, another from the non-profit community, and the third was an experienced volunteer in service-learning projects. (This panel has been described in detail in this document under Part One: Participants.) This review panel validated the content of the researcher created SLTPP rubric for evaluation of student proposals and the content of the final ITSLB multimedia module.

Procedures. First, the researcher created the SLTPP rubric based on the Ministry of Education Recruitment Brochure (2008) (Appendix A) and the U.S. Service-learning Standards (National Youth Leadership Council, 2008). The same procedures used to evaluate the face and content validity of the RLOs as previously described were used to evaluate the face and content validity of the researcher-designed SLTPP rubric. Basically, the review panel was handed the proposed rubric, and Delphi Survey 8 was used to determine alignment.

It took ten days to find agreement for the content of the rubric. Once the SLTPP rubric was validated, it was ready to be utilized as the instrument by which the students' SLTPPs would be graded.

To validate the content of the final ITSLB multimedia module, the SMEs were given Delphi Survey 9 and access to the website where the ITSLB multimedia module was posted so that they could view the module and establish the content validity.

Instruments. To evaluate the face and content validity of the SLTPP rubric, Delphi Survey 8 was created in Mandarin. Delphi Survey 8 and its translation to English are shown in Appendix E. These items involved service-learning in the curriculum, social resources that can be utilized, student reflection, and benefits for both the student and the population served, among others. Likewise, to evaluate the face and content validity of the final ITSLB multimedia module, Delphi Survey 9 was created in Mandarin. Delphi Survey 9 and its translation to English are shown in Appendix E.

Data Collection and Data Analysis. After the researcher developed the Delphi Survey 8 instrument, the Delphi survey score form was given to the three members of the review panel to validate the SLTPP rubric. Likewise, after the actual ITSLB multimedia

module was functional and the Delphi Survey 9 instrument had been developed to evaluate its content, Delphi Survey 9 was given to the review panel for content validation.

Part Three: Determining the Effectiveness of the Online Module

This section describes how the effectiveness of the online module was determined in order to answer Research Question 3. It also describes the student participants, procedures, the instrument used, and the data collection and analysis procedures.

Participants. All participants (N = 40 individuals) were third and fourth year college learners majoring in Management Information Systems and Telecommunications. They were enrolled in either an online or face-to-face section of Multimedia Design. The experimental group of online learners began with 24 individuals, of which 20 (16 males, four females) submitted the SLTPP. The control group of traditional learners also began with 26 individuals, of which 20 submitted the SLTPP (16 males, four females). None of the participants had previous experience with service-learning and none had previous experience with volunteering their IT skills.

Procedures. The participants received formal instruction two hours per week for eight weeks. They were divided into two groups: one received traditional face-to-face instruction (control); the other received the same instruction through the ITSLB online module (experimental group). After eight weeks, 40 students submitted their Service-Learning Technology Project Proposals (SLTPP). Ten students, four in the experimental group and six in the control group, failed to submit a project and therefore are not included in the study data. Two independent graders (who had attained a master's level degree and who had a minimum of two years of experience in service-learning from an

outside college or university) evaluated the student proposals from both the experimental and control groups using the validated SLTPP rubric.

Instruments. The SLTPP rubric had eight items, and each item was graded using a four-point Likert scale (Appendix F). Thus, the total possible proposal score was 32 points if all eight items received four points. Finally, the performance evaluation was based on the eight criteria in the rubric:(1) Service-Learning integrated into the Curriculum & Instruction, (2) Social Resources, (3) Four Major Phases for Service-Learning, (4) Community Need, (5) Student Reflection, (6) Developing a sense of caring, (7) Quality of life, and (8) The Follow-Up Plan(s) for the Community.

Data Collection and Data Analysis. After the eight-week class concluded, the SLTPPs were collected and the fully completed ones were given to the first grader along with the approved scoring rubric (see Appendix F for the blank SLTPP rubric).

After this grader had returned the projects and completed rubrics, the projects were given to the second grader along with a new set of blank rubrics. By the end of a week, the second grader had returned the projects with her completed rubrics.

The researcher then entered the scores from both sets of rubrics into the statistical software. After determining inter-rater reliability (see Chapter 4), the researcher averaged the two scores on each item for each student, and then totaled the item averages to arrive at a final score for each student on the SLTPP rubric. This final score was used to perform an independent *t*-test to compare the online (treatment) and face-to-face (control) groups.

Summary

There were three parts to the methodology for this study: developing and validating the ITSLB multimedia module; developing and validating the SLTPP rubric to grade the students' service learning project proposals; and determining the effectiveness of the on-line instructional module. The first two parts, involving developing and validating the on-line instructional RLOs and the SLTPP rubric for evaluating the effectiveness of the RLOs, were accomplished by the same review panel of experts. The third part, determining the effectiveness of the ITSLB multimedia module, was achieved by two independent graders.

In the first two parts, the review panel used researcher-developed Delphi surveys to establish face and content validity of the analysis, design, and development of the on-line instructional module, and of the rubric to assess the SLTPPs. In the last part, determining the effectiveness of the on-line instructional module, the participants were the students enrolled in the experimental (on-line) and control (traditional) Multimedia Design class who completed the SLTPPs, which were then evaluated by the two trained graders. An independent *t*-test was used to compare student performance on the SLTPP rubric between the on-line and face-to-face groups.

CHAPTER IV

Results

The purpose of this study was to analyze, design, develop, implement, and evaluate an online instructional sequence in a service-learning project program. In order to examine the effect on learner knowledge and resulting performance, a series of researcher-created RLOs with technology-based service-learning project methods were utilized.

Research Questions

The following research questions were investigated:

1. Can service-learning standards be integrated into a technology work project that leads to a performance assessment for vocational college students with respect to service-learning outcomes?
    a. Do the rationale, goals, and objectives identified for the ITSLB (Information Technology Service-Learning-Based) instruction align with the MOE (Ministry of Education) expectations for service learning?
    b. Do the learning outcomes, learning hierarchy, and learner influences identified for the ITSLB instruction align with the MOE (Ministry of Education) expectations for service learning?
    c. Do the learner characteristics profile, pedagogical considerations, learner constraints, and learning environment and delivery identified for the ITSLB instruction align with the MOE (Ministry of Education) expectations for service learning?
    d. Does the service-learning content identified for the ITSLB instruction align with the MOE (Ministry of Education) expectations for service learning?
    e. Do the project flowcharts and the project storyboards identified for the ITSLB instruction align with the MOE (Ministry of Education) expectations for service learning?

2. Does the SLTPP rubric align with the MOE standards for service-learning performance?
    a. Does the SLTPP rubric have content validity in regards to the MOE standards for service-learning, as determined through a modified Delphi Method review?
    b. Does the ITSLB curriculum have content validity in regards to the MOE standards for service-learning, as determined through a modified Delphi Method review?

3. Is there a significant difference in performance between students who learn service-learning through a multimedia-based module and those who learn service-learning through a traditional presentation of the course curriculum, as measured by a researcher-created instrument?

Results for Research Question One

This section of Chapter IV reports the data obtained from the study pertaining to Research Question One and its five sub-questions. The results for each sub-question are reported separately in the sections below.

1.a. Do the Rationale, Goals, and Objectives identified for the ITSLB multimedia module align with the MOE (Ministry of Education) expectations for service learning?

Research Question 1.a asked whether the rationale, goals, and objectives established for the ITSLB multimedia module were aligned with Ministry of Education expectations for service-learning. (See Appendix A for the MOE expectations outlined in service-learning documents provided to the researcher.) The alignment between the ITSLB service-learning rationale, goals, and objectives, and the MOE expectations was evaluated by a three-member panel of experts using Delphi Survey 1 (see Appendix E). Table 2 displays the panel's responses to Delphi Survey 1.

Table 2

Results of Delphi Survey 1: Alignment of ITSLB Multimedia Module Rationale, Goals, and Objectives, with Ministry of Education Expectations for Service Learning

Item	SME 1	SME 2	SME 3	Mode
Project Rationale (Task A01):				
1. The benefit of this project to the institution or organization is clearly stated.	3	4	4	**4**
2. The benefit of this project to the targeted learners is clearly stated.	3	4	4	4

Item	SME 1	SME 2	SME 3	Mode
3. The need for this project is clearly stated.	3	4	4	4
4. The geographical scope for this project is clearly stated.	4	4	3	4
5. The project's subject matter is clearly stated.	3	4	4	4
6. The project's approach to the problem is clearly stated.	3	3	3	3
7. The project's expected outcome is clearly stated.	4	4	3	4
Project Goal(s) (Task A02):				
8. The goal(s) of this project is clearly stated.	4	4	4	4
9. The goal(s) of this project states what the project is to accomplish.	4	4	4	4
10. The goal(s) of this project clearly indicates how the success will be indicated.	3	4	3	3
11. The goal(s) of this project appears to be achievable.	3	4	3	3
12. The goal(s) of this project appears to be significant to the field of knowledge indicated by the rationale.	3	4	3	3
13. The goal(s) of this project appears to be measurable.	4	4	4	4
14. Considering the target population, the goal(s) of this project appears to be realistic.	4	4	3	4
15. The outcomes of the project appear to be obtainable.	3	4	4	4
Project Objectives (Task A03):				
16. Each objective of this project module is aligned to the goal statement.	4	3	4	4
17. Each objective of this project module contains a behavior/action verb that is measurable.	3	4	4	4
18. Each objective of this project module has an identified audience.	4	4	3	4
19. Each objective of this project module contains a degree/constraint that is clearly stated.	3	4	3	3
20. Each objective of this project module contains a condition/situation that is clearly stated.	3	4	3	3
21. Each objective of this project is aligned to the identified audience.	3	4	3	3

As can be seen in Table 2, all three SMEs either agreed or strongly agreed on each item concerning the rationale, goals, and objectives. The ITSLB module's rationale statement was most strongly supported, with six of seven modal scores being "Strongly Agree." For project objectives, six items were evenly split between three modal scores of "Agree" and three modal scores of "Strongly Agree." The criterion for the development of the ITSLB module's instruction was that all SMEs should agree that the rationale, goals, and objectives were appropriate and aligned with MOE expectations, and this was supported by the survey results.

1.b. Do the learning outcomes, learning hierarchy, and learner influences identified for the ITSBL multimedia module align with the MOE (Ministry of Education) expectations for service learning?

Research Question 1.b asked whether the content validity of the learning outcomes, learning hierarchy and learner influence for the researcher created RLO modules could be aligned with service-learning performance expectations through a Delphi Method review by a three-member SME (Subject Matter Expert) panel. Table 3 displays the final results of Delphi Survey 2.

Table 3

Delphi Survey 2: Learning Hierarchy Map and Learning Influences Unit Plan

Item	SME 1	SME 2	SME 3	Mode
Learning Outcomes Statement (Task A04):				
1. There is an accurate description of the short-term learning effect for each of the objectives for each RLO/Module.	4	4	4	**4**
2. There is an accurate description of the long-term learning effect for each of the objectives for each RLO/Module.	3	4	3	3

Item	SME 1	SME 2	SME 3	Mode
3. There is an accurate description of how the learner is expected to change as a result of each objective.	3	3	4	3
4. There is an accurate description of what is expected to change as a result of the instruction.	4	3	3	3
Learning Hierarchy w/ Content Map (Task A05):				
5. It appears the concept map accurately presents each goal of the project. (Refer to Task A02 for the goal(s), if needed.)	3	4	4	4
6. It appears the concept map accurately presents each of the primary objectives. (Refer to Task A03 for the objectives, if needed.)	4	4	3	4
7. Using the project goal(s) and the project objectives [Task A02 and Task A03] as references, it appears the concept map accurately links each goal with its corresponding primary objective(s).	4	3	3	3
8. Using the project objectives as reference, it appears the concept map accurately presents each of the secondary objectives.	4	3	4	4
9. Using the project objectives as reference, it appears the concept map accurately links each of the secondary objectives to its corresponding primary objective.	4	4	4	4
10. The total concept map presents an accurate depiction of the project.	3	4	3	3
11. The total concept map displays appropriate linkages among all elements.	3	4	3	3
12. The essential prerequisite learner knowledge/skills to achieve the objectives are identified.	4	4	4	4
13. The hierarchic map provides accurate graphical representation of the prerequisite knowledge/skills the learner is to achieve before commencing work on this project's objectives.	4	4	4	4
Learner Influence Document (Task A06):				
14. There is an accurate description for gaining the learner's attention within each RLO/Module.	4	3	3	3

Item	SME 1	SME 2	SME 3	Mode
15. There is an accurate description for maintaining the learner's attention within each RLO/Module.	4	4	4	4
16. There is an accurate description for assessing the learner's satisfaction within the instruction for each RLO/Module.	4	4	4	4
17. There is an accurate description of how each RLO/Module will include a focus on specific learner capabilities.	3	4	3	3
18. There is an accurate description of how each RLO/Module will stimulate the learner's prerequisite knowledge (or skills).	3	4	3	3
19. There is an accurate description of how each RLO/Module will accommodate identified learner disabilities.	3	4	3	3
20. There is an accurate description of how each RLO/Module will respond to a participant's particular learning traits.	3	3	4	3

As can be seen in Table 3, all three SMEs either agreed or strongly agreed for the twenty items. The Learning Content Hierarchy with Content Map was most strongly supported with six of nine modal scores being "Strongly Agree."

The Learner Influence Document had two of seven modal scores being "Strongly Agree." The Learning Outcome Statement had one of four items with the modal score of "Strongly Agree."

The criterion for the development of the ITSLB RLOs was that all SMEs should agree that the learning outcomes, learning hierarchy, and learner influences were appropriate. Therefore, the result for Research Question 1.b is that the learning outcomes hierarchy map, and learning influences were aligned with MOE expectations. Therefore, the results for the outputs of this part of the Analyze Phase aligned with the service-learning performance expectations.

1.c. Do the learner characteristics profile, pedagogical considerations, learner constraints, and learning environment and delivery identified for the ITSLB instruction align with the MOE (Ministry of Education) expectations for service learning?

Research Question 1.c asked whether the content of the learner characteristics profile, pedagogical considerations, learner constraints, and learning environment and delivery for the ITSBL multimedia module was aligned with service-learning performance expectations, as indicated by Delphi reviews by a three-member SME (Subject Matter Expert) panel. Tables 4 and 5 display the final results of Delphi Surveys 3 and 4.

Table 4

Delphi Survey 3: Learner Characteristics Profile and Pedagogical Considerations

Item	SME 1	SME 2	SME 3	Mode
Learner Characteristics Profile (Task A07):				
1. It appears the general characteristics accurately describe the target population of the project.	4	4	4	4
2. It appears the age range accurately represents target population of the project	3	3	4	3
3. It appears the gender distribution accurately represents target population of the project	3	4	4	4
4. It appears the ethnic/cultural distribution accurately represents target population of the project	4	3	3	3
5. It appears the language distribution accurately represents target population of the project	3	4	4	4
6. It appears the entry behavior is appropriate for target population of the project	3	4	3	3
7. It appears the time frame for completion is reasonable for target population of the project	4	4	3	4

Item	SME 1	SME 2	SME 3	Mode
8. It appears the list of prior knowledge needed for completion of the project is complete.	4	4	4	4
9. It appears the statement of prerequisite cognitive skills for completion of the project is complete.	4	3	4	4
10. It appears the statement of prerequisite motor skills for completion of the project is complete.	3	4	3	3
Pedagogical Considerations Statement (Task A08):				
11. It appears that the Pedagogical Considerations Statement has addressed issues regarding instructional sequencing.	4	4	3	4
12. It appears that the Pedagogical Considerations Statement has addressed issues regarding instructional motivation.	3	4	3	3
13. It appears that the Pedagogical Considerations Statement has addressed issues student-centered learning.	4	3	4	4
14. It appears that the Pedagogical Considerations Statement has addressed issues regarding use of an advance organizer or some system to clarify the instructional goals and objectives of the project/	4	4	3	4

As can be seen in Table 4, the three SMEs either agreed or strongly agreed on each item concerning the learner characteristics profile and pedagogical considerations. The Learner Characteristics Profile was strongly supported, with six of ten modal scores being “Strongly Agree.” The Pedagogical Considerations Statement was also strongly supported with three of four modal scores being “Strongly Agree.” The Project Objectives were evenly split between three modal scores of “Agree” and three modal scores of “Strongly Agree.” The criterion for the development of the RLOs was that all SMEs should be in agreement. Therefore, the results for this part of the Analyze Phase are that these elements align with MOE service-learning performance expectations.

Table 5

Delphi Survey 4: Learner Constraints, Learning Environment & Delivery Options

Item	SME 1	SME 2	SME 3	Mode
Learner Constraints Statement (Task A09):				
1. It appears the learner constraints (e.g. Time, budget, user preferences, organizational culture, available technology) have been reasonable addressed for target population of the project.	4	4	4	4
2. It appears the learner constraints regarding ADA considerations have been reasonable addressed for target population of the project.	3	3	4	3
3. It appears the learner constraints regarding network software have been reasonable addressed for target population of the project.	3	4	4	4
Learning Environment & Delivery Options Statement (Task A10):				
4. It appears the specific hardware requirements have been accurately described for the project.	3	4	3	3
5. It appears the specific requirements to navigate the content materials have been accurately described for the project.	4	3	4	4
6. It appears the specific software requirements have been accurately described for the project.	4	4	3	4
7. It appears the specific learner requirements have been accurately described for the project.	3	3	4	3
8. It appears the specific learner requirements for students with physical disabilities have been accurately described for the project.	3	4	3	3
9. It appears the specific learner requirements for students with English as a second language have been accurately described for the project.	4	3	4	4
10. It appears the specific learner requirements for students with cognitive disabilities have been accurately described for the project.	4	4	3	4
11. It appears the specific delivery plan for content assignments has been accurately described for the project.	3	3	4	3

Item	SME 1	SME 2	SME 3	Mode
12. It appears the specific delivery plan for content activities has been accurately described for the project.	4	4	3	4
13. It appears the specific delivery plan for content assessments has been accurately described for the project.	3	3	4	3
14. It appears the specific delivery plan for content assessment feedback has been accurately described for the project.	4	4	3	4
15. It appears the specific delivery plan for student-to-instructor communication has been accurately described for the project.	4	4	4	4

As Table 5 shows, the three SMEs either agreed or strongly agreed on each item concerning the learner constraints and the learning environment and delivery options. Both the Learner Constraints Statement and the Learning Environment and Delivery Options were strongly supported, with three of four modal scores being “Strongly Agree” on the former and seven of twelve modal scores being “Strongly Agree” on the latter. The criterion for the development of the ITSLB RLOs was that all SMEs should agree that the learner constraints statement and the learning environment and delivery options were appropriate. The results for the outputs also aligned with service learning performance expectations. Therefore, the result for Research Question 1.c was that learner characteristics profile, pedagogical considerations, learner constraints, and learning environment and delivery were aligned with MOE expectations.

1.d. Does the service-learning content identified for the ITSLB instruction align with the MOE (Ministry of Education) expectations for service-learning?

Research Question 1.d asked whether the service-learning content identified for the ITSLB instruction aligns with the MOE expectations for service-learning. The MOE

expectations were outlined in service-learning documents provided to the researcher. The alignment between the ITSLB module's content and the MOE expectations was evaluated by a three-member panel of experts using Delphi Survey 5 (see Appendix G). Table 6 displays the panel's responses to Delphi Survey 5.

Table 6

Delphi Survey 5: RLO 1, RLO 2 & RLO 3

Item	SME 1	SME 2	SME 3	Mode
Project Tasks:				
1. The objectives for the tasks are clearly stated.	4	4	4	**4**
2. The listed tasks are aligned with each objective.	4	4	4	4
3. The knowledge identification types are aligned with each task.	4	4	3	4
4. The prerequisite decisions (Y/N) are aligned with each task.	3	4	3	3
5. The environmental factors identified are aligned with each task.	4	3	4	4
6. The domain types are aligned with each task.	4	4	3	4
7. The importance levels are aligned with each task.	3	4	4	4
8. The difficulty levels are aligned with each task.	3	4	3	3
Project Subtasks:				
9. The listed sub-tasks appear to be aligned with the tasks.	4	4	4	4
10. The knowledge identification types are aligned with each subtask.	4	4	3	4
11. The prerequisite decisions (Y/N) are aligned with each subtask.	3	3	4	3
12. The environmental factors are aligned with each subtask.	4	4	3	4
13. The domain types are aligned with each subtask.	3	3	4	3

Item	SME 1	SME 2	SME 3	Mode
14. The importance levels are aligned with each subtask.	4	4	3	4
15. The difficulty levels are aligned with each subtask.	3	4	3	3

As can be seen in Table 6, all three SMEs either agreed or strongly agreed on each item concerning the content of the RLOs. The Project Tasks were the most strongly supported, with six of eight modal scores being "Strongly Agree." In the Project Subtasks, four of seven items were strongly supported, with four modal scores being "Strongly Agree" and three modal scores being "Agree." The criterion for the development of the ITSLB instruction was that all SMEs should agree that the content of the RLOs was appropriate. Therefore, the result for Research Question 1.d was that the content aligned with MOE expectations.

1.e. Do the project flowcharts and the project storyboards identified for the ITSLB instruction align with the MOE (Ministry of Education) expectations for service learning?

Research Question 1.e asked whether the project story boards and project flowcharts align with the MOE expectations. The alignment between the SLTPP project storyboards and project flow-charts and the MOE expectations for service learning was evaluated by a three-member panel using Delphi Survey 06 and Delphi Survey 07 (Appendix G). Table 07 displays the panel's response to Delphi Survey 06 concerning the project flow-charts.

Table 7

Delphi Survey 6: Project Flowcharts

Item	SME 1	SME 2	SME 3	Mode
1. Each objective for the module is represented in the flowchart.	4	4	4	4
2. Appropriate content in support of each objective is represented in the flowchart.	4	4	4	4
3. Assessments for each objective are represented in the flowchart.	4	4	4	4
4. Appropriate decision points are represented in the flowchart.	4	4	3	4
5. The content within the flowchart is appropriately sequenced for the module.	4	4	4	4

As can be seen in Table 7, three SMEs strongly agreed on each item concerning the project flowcharts, with the modal scores on the five items being "Strongly Agree." The criterion for the development of the project flowcharts was that all SMEs should agree that the project flowcharts were appropriate. Therefore, the result for Research Question 1.e is that the project flowcharts aligned with MOE expectations.

Table 8

Delphi Survey 7: Project Storyboards

Item	SME 1	SME 2	SME 3	Mode
1. There is a series of storyboards aligned with the flowcharts (Task D02).	4	4	4	4
2. The placement for graphical elements is included in the storyboards.	4	4	4	4
3. The type of graphical elements is identified in the storyboards.	4	4	4	4
4. The size parameters of graphical elements are identified in the storyboards.	4	4	4	4

	Item	SME 1	SME 2	SME 3	Mode
5.	The placement for textual elements is included in the storyboards.	4	4	4	4
6.	The font style for textual elements is included in the storyboards.	4	4	4	4
7.	The font size for textual elements is included in the storyboards.	4	4	4	4
8.	Hypertext links (where needed) are indicated in the storyboards.	4	4	4	4
9.	The placement of hypertext links is indicated in the storyboards.	4	4	4	4
10.	Navigation buttons (where needed) are indicated in the storyboards.	4	4	4	4
11.	The placement of navigation buttons is indicated in the storyboards.	4	4	4	4
12.	The style of navigation buttons is indicated in the storyboards.	4	4	4	4

Table 8 shows the three SMEs strongly agreed on each item concerning the project storyboards, with the modal scores on the twelve items being “Strongly Agree.” The criterion for the development of the project storyboards was that all SMEs should agree that the project storyboards were appropriate. Therefore, the result for Research Question 1.e is that the project storyboards aligned with MOE expectations.

In sum, the results from data obtained by the study pertaining to Research Question One support the hypothesis that service-learning standards can be integrated into a technology work project that leads to a performance assessment for vocational college students with respect to service-learning outcomes.

Results for Research Question Two

This section of Chapter IV reports the data obtained from the study pertaining to Research Question Two: *Does the SLTPP rubric align with the MOE standards for service-learning performance?* Research Question Two has two sub-questions. The results for each sub-question are reported separately in the sections below.

Research Question 2.a asked whether the content validity of the researcher created SLTPP rubric could be aligned with service-learning performance standards through a Delphi Method review by a three-member SME panel. Table 9 displays the final results of Delphi Survey 8.

Table 9

Delphi Survey 8: Service-Learning Technology Project Proposal Rubric

Item	SME 1	SME 2	SME 3	Mode
1. It appears the Service-Learning integrated into the Curriculum & Instruction accurately describe the target Service-Learning Project Scoring Rubric of the project.	4	4	4	4
2. It appears the Social Resources accurately describe the target Service-Learning Project Scoring Rubric of the project.	4	4	4	4
3. It appears the Four Major Phases for Service-Learning accurately describe the target Service-Learning Project Scoring Rubric of the project.	4	4	4	4
4. It appears the Community Need accurately describe the target Service-Learning Project Scoring Rubric of the project.	4	4	4	4
5. It appears the Student Reflection accurately describe the target Service-Learning Project Scoring Rubric of the project.	4	4	4	4
6. It appears the Developing a sense of caring accurately describe the target Service-Learning Project Scoring Rubric of the project.	4	4	4	4
7. It appears the Quality of life accurately describe the target Service-Learning Project Scoring Rubric of the project.	4	4	4	4
8. It appears the The Follow-Up Plan(s) for the Community accurately describe the target Service-Learning Project Scoring Rubric of the project.	4	4	4	4

As can be seen in Table 9, the three SMEs strongly agreed on the eight items of the Delphi 8 survey instrument. The criterion for the development of the SLTPP rubric was that all SMEs should agree that the rubric appropriately aligned with the service learning standards. Therefore, the result for Research Question 2.a is that the content validity of the researcher created SLTPP rubric could be aligned with service-learning performance standards.

Research Question 2.b asked whether the content validity of the service learning curriculum developed by the researcher could be aligned with service-learning performance standards as determined through a Delphi review by a SME (Subject Matter Expert) panel. Table 10 displays the final results of Delphi Survey 9.

Table 10

Delphi Survey 9: Information Technology Service-Learning Based (ITSLB) Multimedia On-Line Module

Item	SME 1	SME 2	SME 3	Mode
1. The benefit of this project to the targeted learners is clearly stated.	3	3	4	3
2. The number of reference websites for the service-learning module is adequate	4	4	4	4
3. The reference cases for this project are clearly stated.	4	4	4	4
4. The project's rubric items are clearly stated.	4	3	4	4
5. The question bank for the module is aligned with the service-learning content.	3	4	4	4
6. The question bank's item format is clearly measurable. (Multiple choice and Complex topics.)	4	4	4	4
7. The learning objectives for each unit of this project are clearly stated.	4	4	4	4
8. .Each objective for this instructional content is aligned to the goal statement.	4	4	4	4
9. Each objective of this instructional content is aligned to the identified audience.	4	4	4	4

Item	SME 1	SME 2	SME 3	Mode
10. The service-learning graphics (still images, video) on the blogger are aligned with the module's content	4	4	4	4
11. The technology tools students will use for the service-learning module are aligned with the targeted learners' technology experience.	4	4	4	4

As can be seen in Table 10, the three SMEs strongly agreed on items two through eleven on the Delphi 9 survey instrument with item one at the "Agree" point for three members and one at the "Strongly Agree" level. Thus, eight of nine modal scores were at the "Strongly Agree" rating.

The criterion for the development of the ITSLB multimedia online module was that all SMEs should agree that the module aligned with the MOE service learning standards. Therefore, the result for Research Question 2.b is that the content of the service-learning curriculum was aligned with service-learning performance standards. The results obtained support the hypothesis that the content validity of the researcher created SLTPP rubric could be aligned with service-learning performance standards, as indicated by a Delphi Method review by a three member SME (Subject Matter Expert) panel.

Results for Research Question Three

This section reports the data obtained from the study pertaining to Research Question Three: *Is there a significant difference in performance between students who learn service-learning through a multimedia-based module and those who learn service-learning through a traditional presentation of the course curriculum, as measured by a researcher-created instrument?* The results are reported separately in the sections below.

This discussion begins by examining the project-proposal results of the Service-learning Technology Project Proposal (SLTPP) rubric for the Experimental group and the Control group. The data presented represent two trained graders' responses on an 8-item, Likert-scaled instrument designed to score the students' (experimental and control group) project proposals.

The SLTPP rubric (Appendix F) consisted of eight criteria: (1) Service-Learning integrated into the Curriculum & Instruction, (2) Social Resources, (3) Four Major Phases for Service-Learning, (4) Community Need, (5) Student Reflection, (6) Developing a sense of caring, (7) Quality of life, and (8) The Follow-Up Plan(s) for the Community. The SLTPP rubric was utilized by two trained graders to evaluate student outcomes on each of the eight areas based on a four-point scaled instrument (Appendix F) from Strongly Disagree to Strongly Agree. Thus, the total possible SLTPP score was 32 points.

Inter-rater reliability was determined by comparing the graders' scores on each of the eight items of the 40 SLTPP rubrics (20 experimental and 20 control), totaling 320 scoring opportunities. Two methods were used. First, when both graders rated an item either "Agree" or "Strongly Agree," this was counted as a match between the graders. Likewise, when both graders rated an item either "Disagree" or "Strongly Disagree," this was also counted as a match between the graders. Of the 320 opportunities to match, 315 matched as "Strongly Agree" or "Agree," and one matched as "Strongly Disagree" or "Disagree." There were four times when the graders did not match: one grader rated an item "Strongly Agree" or "Agree" and the other grader rated the same item "Strongly Disagree" or "Disagree" (Proposal 7, item 8; Proposal 23, items 4 and 7; and Proposal 35,

item 8; see Appendix I). The graders matched 316 times out of 320 possible times, giving an inter-rater reliability score of .988.

The second way of determining inter-rater reliability counted matches only when both graders scored an item exactly the same. Using this method, both graders scored the same item "Strongly Agree" 231 times, "Agree" 27 times, "Disagree" 0 times and "Strongly Disagree" 0 times. The graders matched 258 times out of 320 possible times, for an inter-rater reliability score of .806.

In 1981, both Fleiss (as cited in Barrett, 2001, p. 24) and Cicchetti and Sparrow (as cited in Barrett, 2001, p. 24) considered inter-rater reliability scores above .74 as "excellent." Therefore, since both methods of determining inter-rater reliability used in this research were above .74, inter-rater reliability between the two graders was acceptable. With such a high inter-rater reliability, an average of the two graders' scores on each item for each student was calculated; the student score on the SLTPP rubric that was used in the next calculation was the sum of the averaged item scores.

An independent *t*-test was conducted to test for significant differences between SLTPP scores of the Experimental and Control groups. These results are displayed in Table 11.

Table 11

Independent t-test *of Service-Learning Technology Project Performance*

Group	**N**	**Mean**	**SD**	**t**	**p**
Experimental	20	31.05	2.02	.646	.522
Control	20	29.75	2.5		

Note: Descriptive Statistics: Experimental and Control Groups (N= 40)

The mean score of the Experimental group was not significantly different from the mean score of the Control group ($t = .646$, $p = .522$). Therefore, the result for Research Question 3 is that there was no difference in performance between students who received service learning instruction through the online ITSLB multimedia module and students who received the traditional, face-to-face, classroom instruction on service learning.

CHAPTER V

Conclusions and Recommendations

The purpose of this study was to analyze, design, develop, implement, and evaluate an ITSLB multimedia module in a service-learning project proposal program. In order to examine the effect on learner knowledge and resulting performance, the ITSLB multimedia module for service-learning knowledge was implemented for the online (treatment) group; student performance was evaluated using the validated SLTPP rubric, and the performance of the online group was compared to the performance of the traditional instructional group. This chapter includes the summary and conclusions based on the results and recommendations for future research and practitioners.

Interpretation of Results

In analyzing the data for Research Question One, the findings indicate that the teaching content and instructional materials for service-learning established for the ITSLB multimedia module -- that is, the rationale, goals, objectives, learning outcomes, learning hierarchy, learner influences, learner characteristics profile, pedagogical considerations, learner constraints, learning environment and delivery, content, project flowcharts, and project storyboards -- align with the Taiwan Ministry of Education expectations for service-learning. Thus, the hypothesis that service-learning standards can be integrated into a technology work project for vocational college students with respect to MOE service-learning outcomes is supported by the results of Delphi Surveys 1-7 (see Chapter IV).

Similarly, an analysis of the data for Research Question Two indicates the SLTPP rubric and the service-learning curriculum align with the MOE standards for

service-learning. The RLOs developed for the on-line instruction module and the rubric for evaluating service-learning project proposals, developed utilizing the ADDIE model and Delphi Method, meet MOE service-learning standards for Taiwan as assessed by the SME panel. This means that the instructional module was valid with respect to MOE service-learning standards, and that the SLTPP rubric was a valid instrument for assessing the students' service-learning project proposals.

Regarding Research Question Three, the performance of students who learned service-learning content through the ITSLB multimedia module was equal to the performance of students who learned service-learning content in the traditional classroom. The ITSLB multimedia module successfully substituted for traditional teaching as indicated by the trained graders using the SLTPP rubric. The development of the SLTPP rubric resulted in a valid measurement tool that aligns with MOE standards for service-learning project proposals.

Future Research

In the short term, the next step should be for the students to implement their service-learning proposals and for the researcher to analyze the results to see whether those in the experimental group had more effective outcomes or benefited more from their experiences than those in the control group. If they did, that would provide further evidence of the strength of the service-learning multimedia module and the role of the ADDIE model of instructional design in its development.

Among the limitations of this study was the small size of the experimental and control groups (20 in each), and the relatively small number of SMEs (3) who validated the ITSLB multimedia module and the SLTPP rubric. If funding were available, the

study could be replicated with a larger number of student participants and with additional SMEs, including an expert from each of the three regions of Taiwan to ensure that a full of range of opinions is included. It would also be desirable to include one or two graduates who have been involved in service-learning to obtain the perspective and insights of their experiences. Enlarging the panel of SMEs and including faculty from all parts of Taiwan would better represent universally accepted expert opinion.

Another limitation resulted from the fact that the targeted school assigned students to classes. This meant the researcher was unable to randomly assign students to the study conditions, limiting the generalizability of the study results. There are public colleges and universities in Taiwan that have service-learning departments that would welcome this study and may allow the researcher to assign students randomly to the experimental and control groups. This would ensure that the two groups were comparable at the beginning of the study. If similar results were obtained when the ITSLB multimedia module is applied to a larger number of technology students randomly assigned to experimental and control groups, then it could be demonstrated convincingly that the module was equal to traditional instruction in terms of student outcomes.

Another concern is the potential for students in the experimental and control groups to interact and thereby influence the results. This is a concern because in most departments in Taiwan colleges and universities, students in the same department are encouraged to interact. They share the same labs, take the same classes together, are assigned to the same academic clubs, and study together. To avoid interaction between members of the experimental and control groups, students could be drawn from programs at two different colleges or universities that have the same entrance score requirements so

that the participating students would be similar in that regard and interaction would be minimized.

The limitation resulting from nuances lost during translation could be minimized by creating all the instruments in Mandarin at the beginning. The resulting surveys and results could then be translated by a bilingual Mandarin/English speaker familiar with both cultures for publication in an international journal focused on issues in higher education.

As to the delimitation or boundary set by the eight week duration of the study, if students were given 12-14 weeks to study the ITSLB multimedia module and create their SLTPPs, they would have sufficient time to communicate and connect with the community for whom they are designing their proposals. This could allow them to develop more useful proposals that meet the needs of the community. Then, in the final four weeks of the semester, they could apply their SLTPPs, and this would strengthen their learning and allow them to discover if their project proposals are effective in the community.

At the time this research was undertaken, there was no existing standard rubric in accordance with MOE requirements for evaluating IT service-learning project proposals. However, the SLTPP rubric created and validated here is now available for use. How useful it would be in another country is yet to be determined.

Similarly, if the ITSLB multimedia module and the SLTPP rubric were applied to students in other disciplines and at other Taiwan institutions and similar results were obtained, the benefit of using this module and the SLTPP rubric would be expanded. This researcher's study suggests the ITSLB multimedia module and SLTPP rubric are valid

and effective means of teaching about service-learning and assessing service-learning project proposals. Expanding their integration into other fields, such as the visual or performing arts, English as a second language, or information management systems, for example, could provide further evidence of their usefulness.

Implications for Practitioners

The information technology service-learning based multimedia module developed for this study was as effective in delivering technology service-learning project proposal content as traditional classroom instruction for this study's targeted learners. Because the ITSLB module and the SLTPP rubric are on-line, they are available for any practitioner in Taiwan to use. Their use might help students in other vocational technology service-learning classes, on-line or traditional, to gain the necessary skills to complete a fully functional project proposal design resulting in successful funding of their project by the MOE.

The ITSLB multimedia module and SLTPP rubric are precisely the kind of dynamic program design improvement that Davi, Frydenberg, and Gulati (2007) supported because using the interactive multimedia module and creating a project proposal engage the students in their own learning. According to Cheng (2008), students who performed service-learning had an increase in their problem-solving and analytical skills. By using the guidelines in the SLTPP rubric to develop their proposals, students are taking the first step in developing their problem-solving and analytical skills. Indeed, the guidelines in the SLTPP rubric help students focus on the skills they have gained in their course and how these skills might be of potential value in the community they are

preparing to serve. This process exemplifies the skill-value system discussed by Benbasat, Dexter, and Manta (1980).

Additionally, the methods used in this study -- the ADDIE model and Delphi Method -- to obtain content validity of the rubric and service-learning curriculum could be used by other curriculum designers in Taiwan to develop and validate service-learning materials appropriate for their courses and rubrics for evaluating their students' service-learning project proposals. This might result in standardizing service-learning according to the goals of the MOE. The rubrics developed could help vocational colleges obtain objective assessments of their students' performances and this might result in stronger service-learning projects.

If students are given proposal guidelines that are reflected in the rubric when creating their service-learning project proposals, they know how they are going to be assessed and can improve their proposals accordingly. This might result in better service-learning projects. Student application of the guidelines in the STLPP rubric as they develop and apply their service-learning proposals is a prime example of the desirable experiential activity promoted by McCarthy and Tucker (1999).

Among the criteria of the SLTPP rubric were two that match the curriculum design goals developed by Hong (2010) and the functions of service-learning developed by Shen (1997). For example, the fifth criterion of the SLTPP rubric, *student reflection,* and the sixth criterion, *developing a sense of caring*, are similar to Hong's aspects of attitude, "respect for diversity, helping behavior, and social responsibility" and Shen's fourth function of service-learning, "learn about other aspects of society." In addition, Shen's third function, "gain the experience of cooperation," occurs when students

discover community needs and design follow-up plans for the community, which are the fourth and eighth criteria of the SLTPP rubric.

Interest in service-learning remains high in Taiwan: The Ministry of Education (2017) is currently in the process of requiring service-learning courses for freshmen or first year students at all colleges and universities in the country. To facilitate the implementation of this goal, the MOE might be interested in this researcher presenting the results of this study to service-learning practitioners throughout Taiwan to help these practitioners understand the methodology used. Having the researcher train other practitioners through a workshop protocol could result in standardized formats and content that furthers the goals of the MOE for service-learning. The end result may lead to stronger connections between the communities and the service-learning programs, which is a primary tenet for the MOE. Furthermore, Y. X. Lin (2005) described the benefits of service-learning projects based on technology to both students and people in isolated rural areas of Taiwan. The ITSLB multimedia module and SLTPP rubric developed and validated here will enable students to expand service-learning technology projects into these underserved areas in practice.

In summary, the findings of this research can contribute to service-learning educators' understanding of the benefits of the Information Technology Service-Learning Based (ITSLB) multimedia module and encourage them to use it with their students as appropriate. The study may also inform service-learning educators about the potential uses of a standardized Service-Learning Technology Project Proposal (SLTPP) assessment and be useful as a project proposal evaluation tool in their instructional environments.

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Appendix A

Taiwan Ministry of Education Service-learning Standards Recruitment Brochure

The MOE Standards Recruitment Brochure

1. Basis
   Based on the Executive Yuan's "I-Taiwan 12 Projects—Intelligent Taiwan" Program, "the Promotion Plan of Creating Digital Opportunities," part of the "Equal Digital Opportunities" and "the Plan to Reduce the Digital Divide of Primary and Secondary Schools" of the Ministry of Education, it is developed to cultivate students' spirit of service-learning, to develop the professionalism of volunteers, and to help reduce the digital divide in the rural and remote areas.
2. Objectives of the Program
   (1) Integrate the resources of colleges, high schools, vocational high schools, and the private sector, reduce the digital divide of rural and remote areas, enhance people's information technology literacy, promote the integration of information and teaching, and strengthen localized digital development and marketing of rural and remote areas.
   (2) Equip student volunteers' ability to manage and promote information applications, cultivate their love for communities and spirit of service
3. Duration of Service and Clients
   (1) Duration of Program: From the date the program was approved until May 31, 2010.
   (2) Clients: The Digital Opportunity Centers (DOCs) established by the Ministry of Education and elementary and middle schools in rural and remote areas.
   (3) Every volunteer group should at least provide service to one DOC and a neighboring elementary or middle school.
   (4) Every DOC and school can receive service from only one information volunteer group.
   (5) For the duration of the program, clients cannot be changed without the consent of the Ministry of Education.
4. Scope and Time of Service
   (1) The service items can be classified as:
      i. Information support and maintenance of Internet environment
      ii. Assist in the preserving the community culture in rural areas
      iii. Assist in industrial marketing of the rural areas
      iv. Assist in the information literacy training for the residents of the rural and remote areas
      v. Assist in students' after-school studies
      vi. Organize winter and summer camping activities (information technology applications, competitions, etc.)
      vii. Others
   (2) Time of Service
      i. The main clients are the people who learn at the Digital Opportunity Centers. But during the winter and summer vacations, the main clients will be the students of the elementary and middle schools in the rural and remote areas.
      ii. The volunteer group visits their client at least once a month. The group will consist of at least five teammates and the visit will take at least three hours (excluding traffic time).
      iii. Before the volunteer group provides service to their clients, they should communicate with them regarding the location, time, clients whom they will serve, and so on to ensure the quality and effectiveness of their service.
5. The Make-up of the Team
   The teachers or administrators of colleges, high schools, and vocational high schools serve as leaders and organize the volunteer groups, and come up with the service programs:

(1) The main teammates are the teachers and students of colleges, high schools, and vocational high schools. The team is formed based on service-learning and the spirit of volunteer service.
(2) Every team should have a team leader who is a teacher or an administrator of the above-mentioned schools. Every team leader should at least lead one volunteer group. The leader and his/her teammates should keep in touch for 30 days after the program was finished. Through the duration, no leader should be replaced without the consent of the Ministry of Education.
(3) Every volunteer group should consist of at least ten persons who might be current students or graduates from different school, and departments. Every volunteer can belong to only one group.
(4) Graduates should have more than two years of service experience and should provide service according to the regulations. The number of graduates should not account for more than one third of the whole group.

6. The Procedure of Application:
   (1) Inquiry of needs: Visit the website of the Ministry of Education for Information Volunteers (http://ecare.moe.gov.tw), look for the inquiry form of service needs of DOCs, discuss the service model and contents with the clients, and sigh the "Agreement of Cooperation with Clients." (Appendix 1)
   (2) Fill in the plan: Log on to the above-mentioned website to fill in the "Volunteer Service Plan" (see Appendix 2) and the "Application Form of Grant for the Programs subsidized by the Ministry of Education." (Appendix 3)
7. Approval of the Plan:
   (1) Examination:
   Invite scholars and experts of the related fields to be judges. The key points of examination are as followed:
   i. Service values of the group and organizational teamwork
   ii. Degree of understanding their clients
   iii. The contents of the service program and the way to record its activities
   vi. The plan of self-growth for volunteers
   v. The follow-up plan(s) for group service
   (2) Notification of approval: The Ministry will issue an official document to notify the school of the approval and the school will be able to apply for the "receipts" of receiving the grant.
   (3) The revision of the plan
      i. After the plan is approved, the group should revise their "Plan of Volunteer Service," "Application Form of Grant Subsidized by the Ministry of Education, "and "Roll of Group Members" according to the advice of the judges and print out the papers, check them, and stamp them with the chops.
      ii. Both "the Agreement of Cooperation of Clients" and the "receipts" of the amount of the grant should be mailed to the Computer Center of the Ministry of Education.
      iii. The address:
      12F, 106, Heping E. Rd., Sec. 2, Taipei, 106
      Addressee: Ms. Yu Shu-Ching
      Be sure to mark "Application by information volunteers of the Ministry of Education" on the envelopment.

8. Way to subsidize
   (1) Processed in accordance with "the Guidelines for Approving, and Allocating the Grant of the Ministry of Education and Commission Funds and Closing." The closing should be finished in a month after the project has been done.
   (2) The maximum full grant for every group is NT$ 205,000 which covers the following:
      i. The costs of the group service and the transportation, meals, insurance, and accommodation of attending conferences.
      ii. Service activities and materials for camping activities.
      Iii. The training courses for volunteers.
      vi. The fee for promoting the achievements based on the requirement of the Ministry of Education.
   (3) Transportation fare should account for less than 20% of the grant. The cost of transportation for the group will be reimbursed based on what type of vehicles they use and the amount of petroleum they consume. The balance must be returned.
9. Rights and Obligations of Service Groups
   (1) Rights
      i. The volunteers have both the rights and obligations to finish the plan on schedule. Those whose service hours exceed 36 hours will be awarded with a "Certificate of Information Volunteer Service of Ministry of Education" as encouragement.
      ii. The first-time service volunteers are entitled to receive basic training and special training according to the Volunteer Service of the Ministry of Interior. They might apply for the service records with proof of training.
      iii. The excellent volunteer groups will be publicly praised and awarded with the certificates of the Ministry of Education. They will have the priority of applying for the Ministry's international information volunteer service.
      vi. They may participate in the competitions and receive awards related to the Ministry of Education or other ministries or bureaus.
   (2) Obligations
      i. Participate in conferences: Leaders and members of volunteer groups are required to attend related promotion activities planned by the Ministry during the time of carrying out the service programs, including a.) early-stage conferences, b.) final-stage demonstrations of achievements, c.) conferences and activities related to this program and others.
      ii. Receive volunteer education and training: The training curriculum is listed in the "Suggestions for Training the Information Volunteer Groups of the Ministry of Education" for reference. (Appendix 4) Volunteers are encouraged to apply the training to their service contents.
      iii. Service Rules: The volunteer service should comply with "the Ministry of Education's Rules of Information Volunteer Service and Safety. (Appendix 5)
      vi. Fill in the service records: The Volunteer Groups should provide service according to the work schedule of the plan and fill in the service record (See Appendix 6) on the volunteer service website in a week after the service has been completed or complete the monthly service schedule at the end of every month for the sake of evaluating volunteer service (See Appendix 7).
      v. Approval and Closing: The report of achievements of the plan (See Appendix 8) and the balance sheet of expense and income should be turned in a month after the program has been finished.
10. Notice
   (1) In order to establish a long-term relationship between service volunteer groups and the clients, please take traffic and time into consideration when choosing clients.

(2) When every volunteer group discusses the contents of service with a DOC, they are supposed to plan it with the DOC and the team of counselors of the Ministry to come up with the plan that will correspond to the operation of DOCs.

(3) Suppose Volunteer groups are unable to schedule the right time for the group to provide service, they should reach the consensus with DOCs in terms of the way of service and do not head for the venue to avoid any kind of conflict.

(4) The title "Information Volunteer Group Service of the Ministry of Education" or the logo of the Ministry should appear in the following: group activities, the decoration of the place where activities take place, publicity material, etc.

(5) The information, photos, and achievements, etc. of all the volunteer groups are authorized to be used in the non-commercial area by the Ministry.

(6) After the grant is approved, the Ministry will assign representatives to supervise the service groups, depending on the circumstances. If any volunteer group fails to meet the standard, or the service is not effective, or something wrong shall happen, or the procedure is not complete, the Ministry will ask the volunteer groups to return all of the grant.

(7) Without the consent of the Ministry, any volunteer groups are not allowed to apply any similar subsidy plan, for example, "Camping Activities of Elementary and Middle Schools in the Education Priority Areas," "College Societies' Promoting the Societies of Elementary and Middle Schools," "Computer Camps to Reduce Digital Divide among Elementary and Middle Schools," and other service plans similar to the Program to Reduce Digital Divide so that the resources will not overlap. If any volunteer group fails to comply with this rule and if verified, they will be required to return all of the grant.

11. Contacts:

(1) During the operation, the "Information Volunteer Operation Center" commissioned by the Ministry will assist in related business and problems. It's website is http://ecare.moe.gov.tw
The contact person is Ms. Lien Yu-Hwa from Far East University of Technology. Her contact information is as followed:
Tel: (06) 5979-566 #7799
E-mail: edu.ecare@gmail.com

(2) The contact person of the Ministry of Education: Ms. Yu Shu-Ching from the Computer Center of the Ministry of Education. Her contact information is as followed:
Tel: (02) 7712-9072
E-mail: ching@mail.moe.gov.tw
Address: 12F, 106, Heping E. Rd., Sec. 2, Taipei

Appendix B

ITSLB Multimedia Module Development: ADDIE Model

ADDIE Model Application Process

The development of the service-learning project utilized the ADDIE instructional design model, which is composed of five principle parts: (1) Analyze, (2) Design, (3) Develop, (4) Implement, and (5) Evaluate. The Evaluate phase occurred in each of the first four phases as the process of formative assessment.

Each of the phases of the ADDIE model is composed of tasks. Since the ADDIE approach is central to the instructional design for this research, it is important to present the details related to the various tasks contained within each phase.

Analyze phase. Tasks within this first phase involved four domains: Content-related, Instructional-related, Environment-related, and management related (see Figure 1).

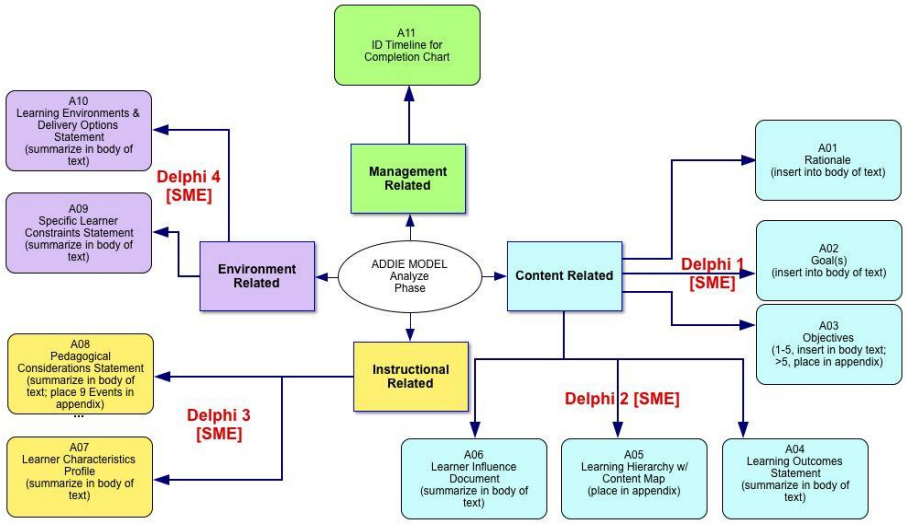


Figure 1. The Domains, Tasks, and Delphi surveys for the Analyze phase of the ADDIE model ©2013 (revised) A. Strickland, J. Strickland, Moulton, & White

Eleven tasks were identified within the Analyze phase; Table 1 details these, along with the type of validity and expert review expected for each task.

Table 1

ADDIE Analyze Phase: Required tasks, and types of validity, and Delphi judges.

Task	Description	Face Validity	Content Validity
Task A01	Rationale	SME	SME
Task A02	Goal	SME	SME
Task A03	Objectives	SME	SME
Task A04	Learning Outcomes Statement	SME	n/a
Task A05	Learning Hierarchy with Content Map	SME	n/a
Task A06	Learner Influence Document	SME	n/a
Task A07	Learner Characteristics Profile	SME	n/a
Task A08	Learning Environment & Delivery Options	SME	n/a
Task A09	Learner Constraints Statement	SME	n/a
Task A10	Pedagogical Considerations Statement	SME	n/a
Task A11	ID Timeline	SME	n/a

An added element to the standard Analyze phase tasks for this study was the confirmation that the Taiwan Ministry of Education (MOE) standards for service-learning were supported by the researcher-created goals and objectives. Therefore, this process was examined within a subsidiary Delphi survey appended to the regular Delphi 1 instrument.

Appendix D and Appendix G consist of applicable components for the Analyze phase that were broken into four categories: (1) the tasks; (2) the Delphi survey template for the tasks; (3) the raw data from the Delphi survey; and, (4) the final version of the tasks with an explanation of the changes.

The first three tasks (A01 Rationale; A02 Goals; A03 Objectives) were examined through the Delphi 1 survey instrument.

Task A01: Rationale. The rationale (Task A01) contained a brief statement that served as a guide for the project. The rationale identified by the researcher of this study is as follows:

> By conducting this study, the importance of IT service-learning projects and how they can be used in parts of rural Taiwan will be demonstrated. Without digital classrooms and other forms of online education, these remote parts of Taiwan would not be afforded the opportunity to learn the curriculum at the same

implementation level as those in more populous areas. Through this study, the researcher hopes to create an educational model that can be used for future students in Taiwanese colleges.

Task A02: Goal. The project goal was evaluated for face validity employing the Delphi Technique. According to project guidelines, a goal statement was constructed with distinct properties based on the purpose of the study and should judge the aptitude through the use of: (1) Measureable, (2) Achievable, (3) Specific, and (4) Significant (MASS) aspects (Strickland, J., Moulton, Strickland, A., & White, 2010). The goals for this proposed project were:

1. To design and aid in the construction of the service-learning project proposals. This study seeks to explore service-learning project proposals and how they can be integrated into an existing technology-based curriculum.

2. To develop a standard rubric that can be used as a systematic evaluation for service-learning project proposals.

Task A03: Objectives. The project objectives were generated by using Gagne's (Gagne, Wager, Golas, & Keller, 2005) five-part format: (1) Situation, (2) Learned Capability Verb, (3) Object, (4) Action Verb, and (5) Tools or Constraints in order to access the study's research. The objectives for this research study were:

1. Students will demonstrate the standards for service learning within a technology work project at the criterion of 90% as measured by a selected-response knowledge assessment.

2. Students will demonstrate the basic principles of service learning within a technology work project at the criterion of 90% as measured by a selected-response knowledge assessment.

3. Students will demonstrate the ability to create a service-learning component within a technology work project at the criterion of 90% as measured by a product rubric.

Delphi Survey 1. The Rationale, Goal, and Objectives were evaluated using the first Delphi instrument (Delphi 1; see Figure 1 and Appendix D).

The SME panel was asked to determine if the project goals and objectives were aligned with the MOE service-learning standards. Since this process was added to the normal Delphi review, the survey instrument was identified as Delphi Survey 1.

The Taiwan Ministry of Education has embraced the need for connections among learners and the communities in which they reside. The process has been established by which service-learning proposals are created, and then judged through a competition. Implementation of the proposals within the communities requires a strong partnership between the learner, or a group of learners working in teams, and a community entity, such as a community garden or park, a cultural center, or another public facility that serves its residents.

These standards have not been validated through a purposeful process that attempts to demonstrate alignment with a curriculum (goals and objectives). Thus, a variety of proposal formats and content may be created, some of which may not meet the expectations set by the Taiwan Ministry of Education.

The researcher sought consensus among the panel of experts and the resulting data was analyzed in an effort to meet these expectations through a standardized template. Once this was achieved, Table 2 in Chapter 3 represents the summary data from this examination; Appendix G contains the raw data for Delphi 1.

The Delphi Method can be depicted as an iterative method in a flowchart (see Figure 2) with the general process as identifying and selecting the judges for the panel, presenting the items for evaluation by the panel; receiving data related to each judge's

review; establishing the level of consensus; and revision, if needed, followed by re-examination by the judging panel.

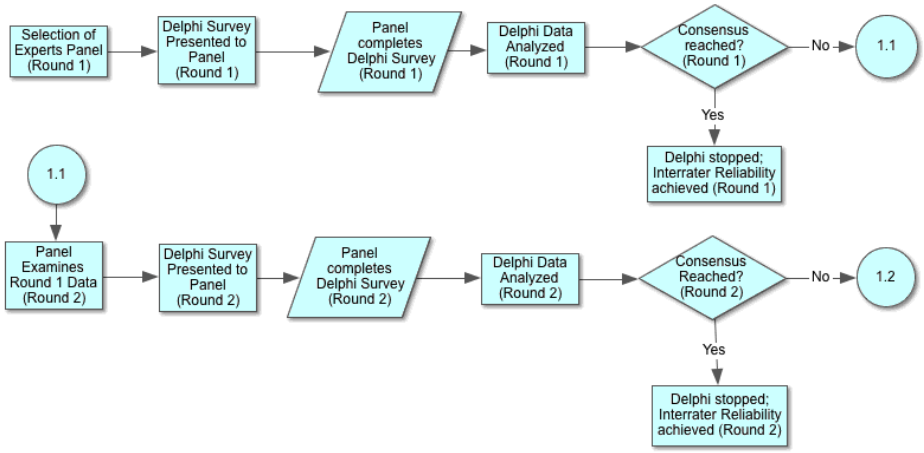


Figure 2. Delphi technique process (Strickland, Moulton, Strickland, White, & Zimmerly, 2010)

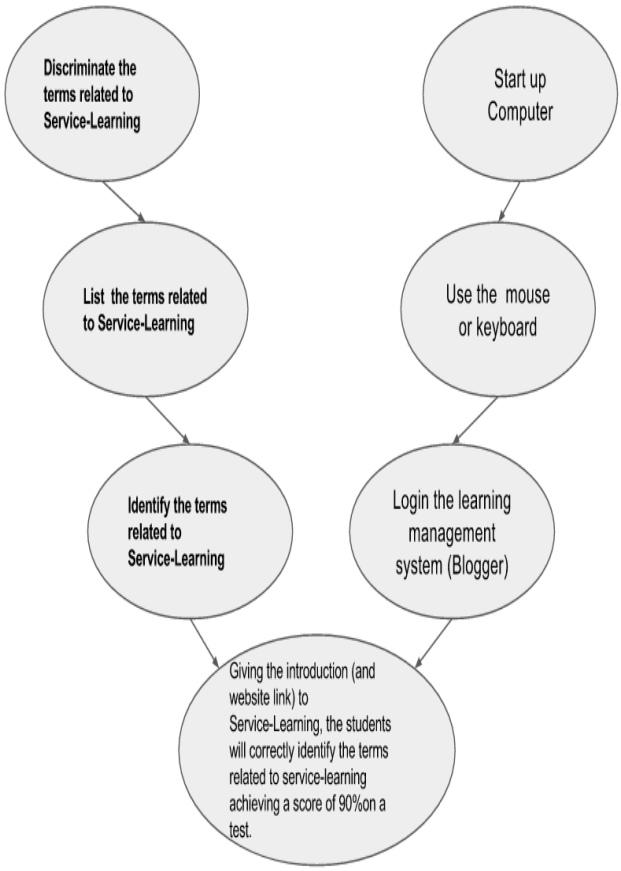
Tasks A04 (Learning Outcomes), A05 (Learning Hierarchy), and A06 (Learning Influences) were examined together by the SME panel; thus, these tasks are discussed together with Delphi Survey 2 results in the following section.

Task A04: Learning Outcomes Statement. The Learning Outcomes Statement used Bloom's Taxonomy of Learning Theory, which consists of three domains: cognitive, affective, and psychomotor. Outcomes for this proposed study were centered on the cognitive domain with student participation guided through methodology based on service-learning principles and practices.

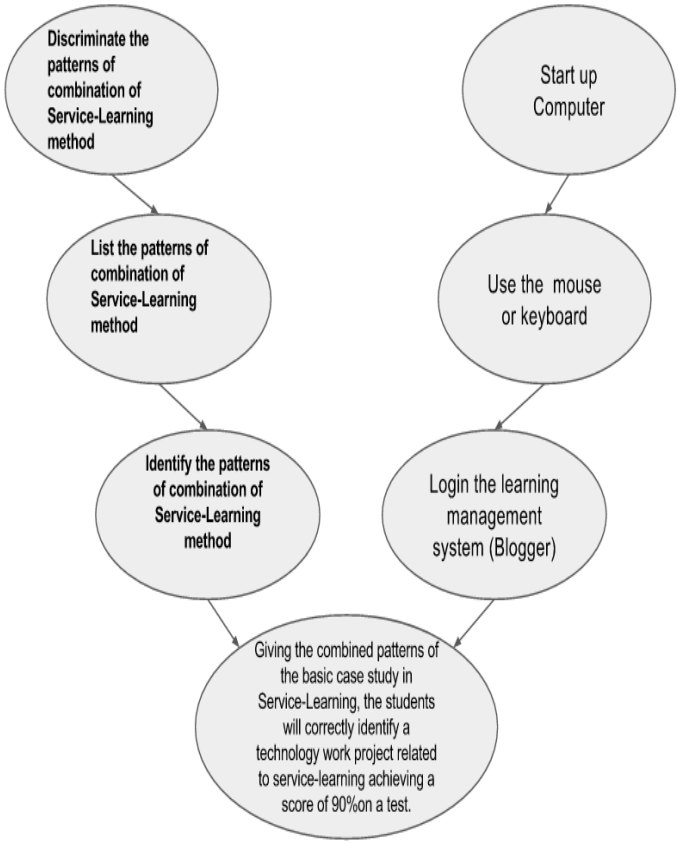
Task A05: Learning Hierarchy Map. The Learning Hierarchy with content map was constructed as a viable organization of the knowledge that was expected as a result of the implementation. The only prerequisite skills for success in the service-learning project were appropriate reading level and basic computer skills. All targeted participants

for the study had these capabilities. The sequencing of content in the hierarchy map can be seen in Figure 3.

RLO 1
LEARNING HIERARCHY SKILL



RLO 2
LEARNING HIERARCHY SKILL



RLO3
LEARNING HIERARCHY SKILL

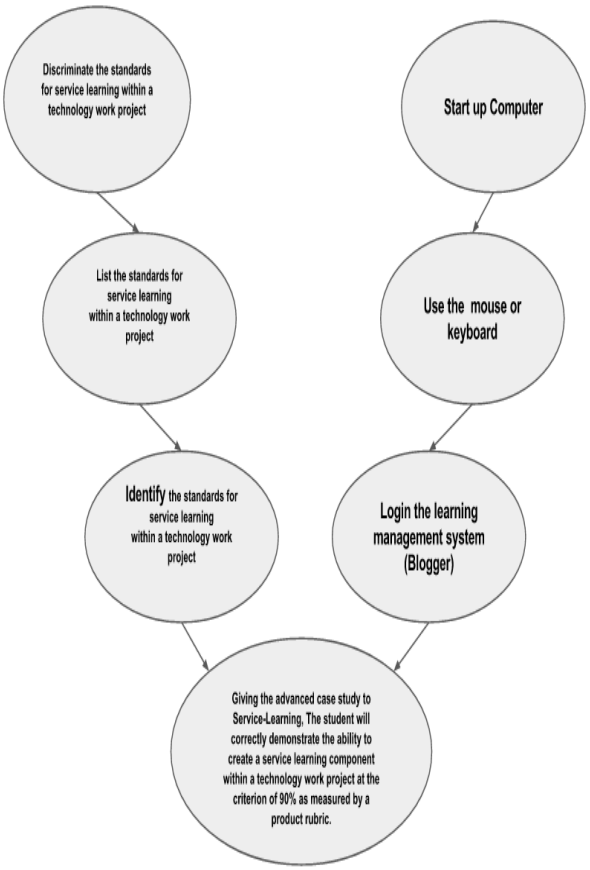


Figure 3. RLOs 1-3 Learning Hierarchy Skills Maps

Task A06: Learning Influences Document. The Learning Influence Document discussed the importance of strategies and how they affect the students within the instruction and how it is applied in the learning environment. Since the researcher was utilizing Gagne's Nine Events of Instruction, the lesson unit plan was developed as the documentation for this task. (The unit plan is contained in Table 2.)

Learning Influences Unit Plan

This document was created to formulate the RLO goals, objectives, assessments, measurements, prerequisites, and instructional consequences. The document is designed to facilitate the recall of accurate information.

Table 2

Learning Influence Plan

Item/Event	Strategies
1. What events will the instructional designer utilize to gain the learner's attention?	Students will play a short, five-question, interactive Jeopardy-type game in App to gain their attention at the beginning of the first class.
2. What techniques will the instructional designer use to maintain the learner's attention?	Students will be shown videos of a service-learning case using technology project methods. Animation and power point slides will show relevant related service-learning history.
3. What events will the instructional designer provide to stimulate recall of prerequisite knowledge?	Students will be shown images of the five kinds of service-learning in the unit. They will match them to the related basic standards of service-learning.
4. How will the instructional designer communicate the learner's responsibility?	Students will be given a printed overview that states their responsibilities; these include attendance, active participation in class, tests taking, and project designing in the final performance assessments.
5. What techniques will the instructional designer use to inform the learner of expected instructional outcomes?	Students will be given a syllabus on line that states the course goals and objectives. In addition, students will be given a pre-test which will assess their prior knowledge, attitude and indirectly point to

	the goals and outcomes through the questions.
6. What techniques will the instructional designer employ to produce inquiry?	In the beginning the class, student will view a video showing aspects of Service-learning and representative project cases from MOE website.
7. How will the instructional designer enhance the learner's recall of the material (i.e., short-term memory)?	Students will be provided with resources such as hyper-links and question bank; concepts used in one content area will be reviewed in the next content area for similarities and difference.
8. How will the instructional designer elicit learner participation?	The instructor will answer students' questions and give them immediately feedback to encourage learner participation.
9. How will the instructional designer utilize feedback gathered from the instructional and the practice materials?	The instructor will use this information to modify the content or talk to individual learners to support them.
10. What learner capabilities will the instructional designer develop as an outcome?	The students' outcomes will be focused on intellectual skills and attitude skills. The students will show that they have the knowledge by passing the quizzes with minimum 90% score and show that they are able to produce one technology project with a minimum 90% score.
11. How has the instructional designer responded to any particular learning trait?	The designer will focus on visual, auditory and kinesthetic traits. Graphics will be used to enhance opportunities for visual learners, key content will be related orally, and practice opportunities will be given to all learners, enhancing the opportunities to learn for kinesthetic learners.
12. How will the instructional designer assess learner satisfaction with the instruction?	Students will be given an attitude survey using a Likert scale at the end of the course.
13. How will the instructional designer accommodate any learner disability (psychomotor, cognitive, emotional)?	The contests will be developed to conform to ADA 508 requirements. For example, students with visual limitations can use the screen reader to acquire the content. Also, second English learners can use Google translation function to translate into their own language.

Delphi Survey 2. The second Delphi survey instrument (see Appendix D) relates to Tasks A04 through A06. For this review, a panel of three SME judges examined the artifacts and ascertained their level of agreement for face validity. The summary data for this process is depicted in Table 3 of Chapter 3. The Learner Characteristics Profile (Task A07) and the Pedagogical Considerations (Task A08) for the project were examined through Delphi 3; thus, the descriptions for these tasks and the data are covered in the following section.

Tasks A07 (Learner Characteristics Profile). The participants of this study ranged from ages 18 to 20, and most were considered college freshmen. The students were enrolled in a Multimedia Design course in a university in Taipei, Taiwan, which was based on curriculum from the second semester of study. There were no anticipated special needs for targeted learners; however, the instructional designer/researcher included multimedia to address any general user preferences in interface design and interaction. The complete Learner Characteristics Profile detail is provided in Table 4.

Table 4

Learning Characteristics Profile

1. General characteristics of your target population	
1.1. Age Range	The student's ages could range between 18 and 20 years old.
1.2. Grade Level	Post-secondary, usually Sophomore level
1.3. Content topic area	Service-learning Foundations and Technology skill development, which are the first class in this curriculum.
1.4. Group characteristics	Some may be traditional students, others nontraditional. All of students are full-time. Some may be working outside the program part-time or full time. Some may have service-learning and/or volunteer skills, but this is not required.
2. What entry behavior(s) is (are) needed for learner success?	

a. Attitude toward learning	This class is mandatory. Student taking this class may be interested in Information Technology related with service-learning techniques because acquiring them may increase their job opportunities and entering great college.
b. Learning preferences or modality	It is likely that most students will be kinesthetic learners; however, some may prefer other modalities, such as audio or visual or have a mixture of preferences.
c. Is it reasonable to expect that this learner(s) can cognitively master the material? Why, or why not.	Yes, because the information presented will be organized to relate to previous service-learning knowledge that these groups have.
d. What is a reasonable time frame for the material to be mastered?	The length of each RLO is two week and requires 50 minutes of instruction. Students can review all materials online as many times as they wish. Some students may be mastered material 2 hours; others may take up to3 hours depending on their previous knowledge.
e. What is the motivation for the learner to complete this RLO?	The primary reason for the learner to complete the RLOs is to acquire basic knowledge-learning which may enhance students to finish advanced projects in the curriculum that meets standards.
3. What prior knowledge is needed for learner success?	Students are expected to have basic service-learning preparation knowledge. Basic computer knowledge will facilitate student learning.
a. List prerequisite skills	There are no prerequisite skills needed for the technology project to complete program. However, students need to be able to read and write at a secondary level. Some advanced computing skills will be helpful for the treatment group.
b. List prerequisite course work	There is no prerequisite course work required for this project.
c. Are there any prerequisite motor skills?	Student in the treatment group should be able to use a mouse and keyboard
d. What previous experience would the learner have that would inhibit this ROL?	Previous experiences will have no inhibiting effect on these RLOs.
4. What is the learner's performance level?	
a. Current level	Students have general basic computer knowledge and skills.
b. Target level (desired outcome)	Students will possess basic level knowledge related to service-learning and its role in Information

	technology. Students will exhibit basic technology project skills in performance assessment methods.
c.Performance gap or discrepancy	Understanding of the service-learning standards, their related Meaningful Service, Link to Curriculum, Reflection, Diversity, Youth Voice, Partnerships, Progress Monitoring and Duration and Intensity.
5. How did you (or, how will you) obtain the learner characteristics (survey, questionnaires, historical data, testing, etc.)?	Learner characteristics will be obtained by interviewing the class instructor.

Task A08: Pedagogical Considerations. By using Gagné's nine events of instruction (2005), and Keller's motivation theory (1984), the researcher established clear instructional guidelines. Gagné's nine events consist of: gaining attention, presenting the objectives, recalling prerequisites, presenting the new content, providing learner guidance, providing for practice, providing feedback, assessing performance, and retention. Keller's motivation theory includes: attention, relevance, confidence, and satisfaction. Both of these theories contribute to the study by providing pedagogical guidelines.

Delphi Survey 3. A panel of subject matter experts, comprised of three judges, was asked to evaluate the face validity for Tasks A07 and A08. (See Appendix D for the survey.) The summary statistics for this examination are shown in Table 4 of Chapter 3.

Tasks A09 (Learner Constraints) and A10 (Learning Environment and Delivery Options) were examined together through Delphi 4 by the SMEs. The following section presents Tasks A09 and A10.

Task A09: Learner Constraints Statement. The specific Learner Constraints Statement identified various potential obstacles with two different delivery methods: online, computer-based method (treatment group), and a face-to-face, traditional classroom setting (control group). The constraints of this study pertained to interaction with course content through an online (treatment group) and face-to-face (control group)

mode. It was important for treatment group participants to have access to current technologies for connection to materials and transmission of assignments. It was not anticipated that learners would encounter unusual delays in relation to equipment or connectivity. Since all participants were enrolled in the same course and under the same curricular program, the time-to-task expectations were not different.

Task A10: Learning Environment & Delivery Options. For the purpose of this study, there were two different types of locations: online and a face-to-face classroom in a traditional lecture orientation. Both environments were significant to the research.

The online interface was through the Moodle learning management system. Students communicated with the instructor via online tools (discussion forums, synchronous chat); in the face-to-face traditional instructional setting, the students directly interacted with the instructor during designated class meeting times.

Delphi Survey 4. A panel of subject matter experts, comprised of three judges, was asked to evaluate the face validity for Tasks A09 and A10 (see Appendix D for the survey). The summary statistics for this examination are displayed in Table 5; raw data are located in Appendix G.

Task A11: Timeline. The ID project timeline allocated the time by task for completion of this project (see Table 5). As a planning tool, it was expected that minor adjustments might be instituted, but the overall integrity of the timeline was maintained. No Delphi panel was required for this task; however, oversight was maintained by the researcher's dissertation chair.

Table 5

Project Timeline

Task	Task Detail	Time(in days)	Comments
Analysis Phase:			
01	Create A01: Project Rationale	2	Rationale will focus on the goal and objectives of the project
02	Create A02: Instructional goals(s) for the project	5	
03	Create A03: Project Objectives	9	There are three RLOs in the project and each has one objective
04	Delphi Survey 1: Send to SME panel	7	The researcher will include Task A01 to A03 with the letter and survey.
05	Delphi Survey 1: Feedback from SME panel	7	This feedback enables the researcher to modify the survey questions.
06	Delphi Survey 1: Survey data analysis	7	If the results are acceptable, produce the final version of Tasks A01 through A03. If results are not acceptable, then repeat as a whole.
07	Prepared the MOE service-learning standards	2	the SME panel will be asked to determine if the project goals and objectives are aligned with the MOE service-learning standards.
08	Create A04:Learning Outcomes Statement	2	
09	Create A05:Learning Hierarchy with Content Map	2	The project concept map will help the SMEs to visualize the project as a whole.
10	Create A06: Learner Influence Unit Plant	2	The purpose of this document is to facilitate the recall of accurate information.
11	Delphi Survey 2: Send to SME panel	7	The researcher will include Task A04 to A06 with the letter and survey.
12	Delphi Survey 2:	7	This feedback enables the

Task	Task Detail	Time(in days)	Comments
	Feedback from SME panel		researcher to modify the survey questions.
13	Delphi Survey 2: Survey data analysis	7	If the results are acceptable, produce the final version of Tasks A04 through A06. If results are not acceptable, then repeat the process.
14	Create A07: Learner Characteristics Profile	5	The researcher will use data from the target institution to create this profile.
15	Create A08: Learning Environment & Delivery Options	6	Both face-to-face and online learning environments must be addressed here. Note: Environment Related & Management Related tasks are combined in one instrument (Delphi 03); see detail under Management Related Tasks section.
16	Delphi Survey 3: Send to SME panel	7	The researcher will include Task A07 to A08 with the letter and survey.
17	Delphi Survey 3: Feedback from SME panel	7	This feedback enables the researcher to modify the survey questions.
18	Delphi Survey 3 Survey data analysis	7	If the results are acceptable, produce the final version of Tasks A07 through A08. If results are not acceptable, then repeat as a whole.
19	Create A09: Learner Constraints Statement	2	Both face-to-face and online learner constraints must be addressed here.
20	Create A10: Pedagogical Considerations Statement	3	This statement summarizes pedagogical considerations developed in the previous tasks.
21	Delphi Survey 4: Send to SME panel	7	The researcher will include Task A09 to A10 with the letter and survey.
22	Delphi Survey 4: Feedback from SME panel	7	This feedback enables the researcher to modify the survey questions.
23	Delphi Survey 4:	7	If the results are acceptable,

Task	Task Detail	Time(in days)	Comments
	Survey data analysis		produce the final version of Tasks A09 through A10. If results are not acceptable, then repeat as a whole.
24	Create A11: ID Time line	1	Time line helps the researcher plan the schedule.

Design Phase

The Design phase was comprised of six tasks that laid the foundation of the instructional materials produced for the study (adapted from Strickland, Moulton, Strickland, White, & Zimmerly, 2010). These tasks and the type of experts using the Delphi Method to judge face validity are displayed in Table 6.

Table 6

ADDIE Design Phase: Tasks and Types of Delphi Judges.

Task	Description	Face Validity	Content Validity
Task D01	Task Analysis	SME	n/a
Task D02	Flowcharts with Content	SME	n/a
Task D03	Storyboards	IDE	n/a
Task D04	Assessment Instruments	SME	n/a
Task D05	Field-test of Assessment Instruments	n/a	n/a
Task D06	Field Test of Prototype	n/a	n/a

As previously indicated for the Analyze phase, the Design process is represented in various appendices (clustered under Appendix E Research Question Two Instrument) with the following organization: (1) the design tasks; (2) the Delphi survey template for the tasks; (3) the raw data from the Delphi survey; and, (4) the final version of the tasks with required revisions and explanations for changes made. Through this purposeful approach, the researcher could both evaluate and process data from the various Delphi surveys. (See Figure 6 for the organization and Delphi technique points within the Design phase.)

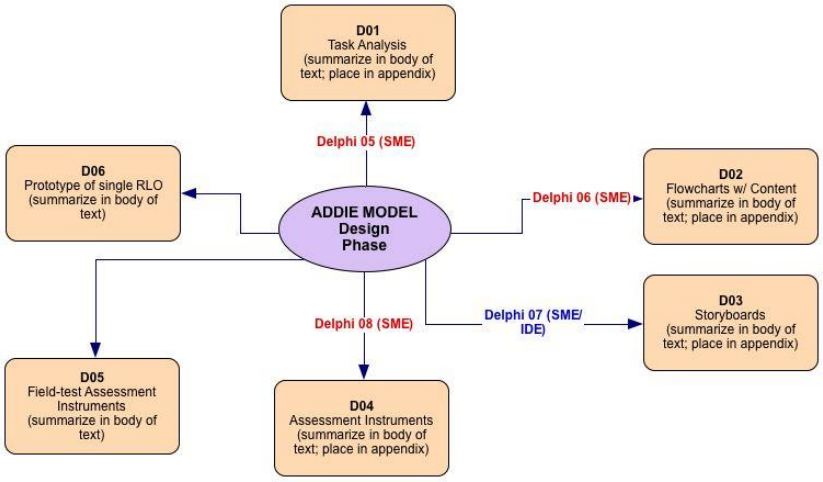


Figure 4. The six tasks of the Design phase of the ADDIE model with Delphi points

Task D01: Task Analysis and Delphi 5. The purpose of a Task Analysis was to identify essential learning (e.g., subject matter content, practices, theories, products, etc.). (See Tables 7-9 for the complete Task Analysis.) This is the first component of the Design phase. To evaluate the task analysis, a SME panel comprised of three judges evaluated the face validity in relation to the already established and validated objectives (see Appendix D for the Delphi Survey 5 instrument). Table 6 in Chapter Four displays the summary data from this panel's examination.

Table 7

Task Analysis: Task D01 RLO 1: Service-Learning History

Task/Sub-task	Knowledge Type (**D, P, S**)	Prerequisite (**Y/N**)	Environmental Factors (**T, E, M, P, L**)	Domain Type	Importance	Difficulty
Objective 1: Given an instruction to definition, history and principles related to Service-Learning. Students will demonstrate the basic principles of service learning within a technology work project at the criterion of 90% as measured by a selected-response knowledge assessment.						
Task 1.1: Define Service-Learning	D	N	T, M, L	C	H	L
Task 1.1.1: Discriminate Service and Learning	D	N	T, M, L	C	H	L
Task 1.2:State the history of Service-Learning	D	N	T, M, L	C	H	L
Task 1.3:State the Development of Service-Learning	D	N	T, M, L	C	H	L
Task 1.4: State the Process of Service-Learning	P	N	T, M, L	C	H	L
Task 1.4.1: preparation	D	N	T, M, L	C	H	L
Task 1.4.2: service/action	D	N	T, M, L	C	H	L
Task 1.4.3: reflection	D	N	T, M, L	C	H	L
Task 1.4.4:celebration	D	N	T, M, L	C	H	L
Task 1.5: State the Function of Service-Learning	D	N	T, M, L	C	H	L
Task 1.5.1: To aspect of student	D	N	T, M, L	C	H	L
Task 1.5.2: To aspect of school	D	N	T, M, L	C	H	L
Task 1.5.3: To aspect of society	D	N	T, M, L	C	H	L
Task 1.6:State the Types of Service-Learning	D	N	T, M, L	C	H	L
Task 1.6.1:In conjunction with the curriculum types	D	N	T, M, L	C	H	L
Task 1.6.1.1:In conjunction with the revision of common curriculum	D	N	T, M, L	C	H	L
Task 1.6.1.2:In conjunction with the general curriculum	D	N	T, M, L	C	H	L
Task 1.6.1.3::In conjunction with the professional curriculum	D	N	T, M, L	C	H	L

Explanation of Terms (Legend):

Column 2: Knowledge Type (**D, P, S**)

Instructions: Mark the column with D, P, or S (choose only one knowledge type)

According to Jonassen (1999), there are three types of knowledge for an Instructional Designer to consider: (1) Declarative (**D**), (2) Procedural (**P**), and (3) Structural (**S**).

Declarative Knowledge is defined as factual knowledge (e, g., the capital of Florida is Tallahassee), and may be thought of in at least two ways: episodic (knowledge is organized by where, when, who) and semantic knowledge (knowledge of the meaning of words, facts, geography, and things that are classified). Declarative knowledge may also include information about concepts.

Procedural Knowledge is defined as a listing of "how" something is done (e.g., driving a car or preparing a recipe). This knowledge type details activities required to perform a specific task. Procedural Knowledge transforms detail tasks into a habitual process (e.g., fire drill instructions, pre-flight check list).

Structural Knowledge is defined as the linking of one concept to another in order to solve a problem, generate a plan or a strategy by setting conditions for a set of procedures.

Column 3: Prerequisite

Instructions: Mark the column with **Y** (yes) or **N** (no) (choose only one)

If prerequisite knowledge or skills are required in order to complete the task (e.g., A student cannot add 3+2 unless the concept of the number 3 and 2 exist prior to the act of addition), then this should be identified in the worksheet.

Column 4: Environmental Factors (**T, E, M, P, L**)

Instructions: Mark the column with **T** (**T**ime), **E** (**E**nvironment), **M** (**M**edia), **P** (**P**hysical condition), or **L** (**L**earning environment) (multiple factors may apply; choose accordingly)

Time is the estimated time to complete the task. (You will use this estimate to compare actual student time to complete the task. The difference between these two quantities (e.g., estimated time 23 min, actual time 36 min, difference 13 minutes) may result in instructional changes to improve performance.

Environment: Examine the literature to see what environmental concerns are related to the specific task requirements. You may also need to consult with one, or more, instructional experts to gain insight.

Media: What is the best media that will assist in the targeted learners in completing the task? You may need to consider your response to the Environment issue (see above) since this may impose conditions on the media that is best given any environmental constraints.

Physical Condition: These are not the same as Environmental issues (see Watson, 1997: *Task Analysis: An Occupational Performance Approach*. Bethesda, MD: The American Occupational Therapy Association). You may wish to examine Card, Moran, and Newell (1983) in relation to

GOMS (Goals, Operators, Methods, Selection) in job task analysis for business, industry, and government.

Learning environment: Considerations should include connectivity, type of hardware/software and peripherals, user interface designs for computer assisted Instruction and distance learning interfaces.

Column 5: Domain (**C, M, A, MO**)

Instructions: Mark the column with **C** (**C**ognitive), **M** (**M**otor), **A** (**A**ffective), or **MO** (**Mo**tivation) (choose only one)

The terms Cognitive, Motor, and Affective are related to Gagne's taxonomy of learning outcomes and are somewhat similar to Bloom's taxonomies of cognitive, affective, and psychomotor outcomes.

Motivation refers to Maslow's Hierarchy of Needs:

Self-Actualization (reaching one's maximum potential)

Esteem (respect from others, self-respect, recognition)

Belonging (affiliation, acceptance, being part of something)

Safety (physical safety, psychological security)

Physiological (hunger, thirst, rest)

Column 6: Importance (**H, M, L**)

Instructions: Mark the column with **H** (**H**igh), **M** (**M**edium), or **L** (**L**ow) (choose only one)

As an instructional designer you will want to determine if a specific task (or subtask) is highly important, of medium importance, or would actually be considered as being at a low level of importance.

Column 7: Difficulty (**H, M, L**)

Instructions: Mark the column with **H** (**H**igh), **M** (**M**edium), or **L** (**L**ow) (choose only one)

Similar to Importance, the instructional designer will want to determine the "weight" of the level of difficulty for the specific task. This my impact the amount of time, or placement, or degree of support needed within the instructional project in order to accomplish this task.

Table 8

Task Analysis: Task D02 RLO 2: Service-Learning Process

Task/Sub-task	Knowledge Type (**D, P, S**)	Prerequisite (**Y/N**)	Environmental Factors (**T, E, M, P, L**)	Domain Type	Importance	Difficulty
Objective2: Given a defined set of integrated principles of examples on Service-Learning project, Students will demonstrate the standards for service learning within a technology work project at the criterion of 90% as measured by a selected-response knowledge assessment.						
Task 2.1: The binding of the activity types	D	N	T, M, L	C	H	L
Task 2.2: Determine the Combination of activities of Service-Learning project	D	Y	T, M, L	C	H	L
Task 2.3: State an example of Winter &Summer vacation community service team	D	Y	T, M, L	C	H	M
Task 2.4: State an example of assisting Primary and Secondary school for student club development	D	Y	T, M, L	C	H	M
Task 2.5: State an example of Charitable exhibition and activity in Community	D	Y	T, M, L	C	H	M
Task 2.6: State an example of helping old service activities	D	Y	T, M, L	C	H	M
Task 2.7: State an example of Educational activity of disadvantaged groups of Primary and Secondary student on winter-break	D	Y	T, M, L	C	H	M
Task 2.8: State an example of Big hands holding little hands Camp Team in winter	D	Y	T, M, L	C	H	M
Task 2.9: State an example of neighborhood community service	D	Y	T, M, L	C	H	M
Task 2.10: State an example of dormitory service-learning	D	Y	T, M, L	C	H	M
Task 2.11: State an overseas example of Ulan Bator (Mongolia) Learning Journey	D	Y	T, M, L	C	H	M
Task 2.12: State an overseas example	D	Y	T, M, L	C	H	M

Task/Sub-task	Knowledge Type (**D, P, S**)	Prerequisite (**Y/N**)	Environmental Factors (**T, E, M, P, L**)	Domain Type	Importance	Difficulty
of Love can change the world -Malawi in Africa						
Task 2.13: Demonstrate an combined example related service-learning	S	Y	T, E,M, L	C	H	H

Explanation of Terms (Legend):

Column 2: Knowledge Type (**D, P, S**)

Instructions: Mark the column with D, P, or S (choose only one knowledge type)

According to Jonassen (1999), there are three types of knowledge for an Instructional Designer to consider: (1) Declarative (**D**), (2) Procedural (**P**), and (3) Structural (**S**).

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Structural Knowledge is defined as the linking of one concept to another in order to solve a problem, generate a plan or a strategy by setting conditions for a set of procedures.

Column 3: Prerequisite

Instructions: Mark the column with **Y** (yes) or **N** (no) (choose only one)

If prerequisite knowledge or skills are required in order to complete the task (e.g., A student cannot add 3+2 unless the concept of the number 3 and 2 exist prior to the act of addition), then this should be identified in the worksheet.

Column 4: Environmental Factors (**T, E, M, P, L**)

Instructions: Mark the column with **T** (**T**ime), **E** (**E**nvironment), **M** (**M**edia), **P** (**P**hysical condition), or **L** (**L**earning environment) (multiple factors may apply; choose accordingly)

Time is the estimated time to complete the task. (You will use this estimate to compare actual student time to complete the task. The difference between these two quantities (e.g., estimated

time 23 min, actual time 36 min, difference 13 minutes) may result in instructional changes to improve performance.

Environment: Examine the literature to see what environmental concerns are related to the specific task requirements. You may also need to consult with one, or more, instructional experts to gain insight.

Media: What is the best media that will assist in the targeted learners in completing the task? You may need to consider your response to the Environment issue (see above) since this may impose conditions on the media that is best given any environmental constraints.

Physical Condition: These are not the same as Environmental issues (see Watson, 1997: *Task Analysis: An Occupational Performance Approach*. Bethesda, MD: The American Occupational Therapy Association). You may wish to examine Card, Moran, and Newell (1983) in relation to GOMS (Goals, Operators, Methods, Selection) in job task analysis for business, industry, and government.

Learning environment: Considerations should include connectivity, type of hardware/software and peripherals, user interface designs for computer assisted Instruction and distance learning interfaces.

Column 5: Domain (**C, M, A, MO**)

Instructions: Mark the column with **C** (**C**ognitive), **M** (**M**otor), **A** (**A**ffective), or **MO** (**Mo**tivation) (choose only one)

The terms Cognitive, Motor, and Affective are related to Gagne's taxonomy of learning outcomes and are somewhat similar to Bloom's taxonomies of cognitive, affective, and psychomotor outcomes.

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Belonging (affiliation, acceptance, being part of something)

Safety (physical safety, psychological security)

Physiological (hunger, thirst, rest)

Column 6: Importance (**H, M, L**)

Instructions: Mark the column with **H** (**H**igh), **M** (**M**edium), or **L** (**L**ow) (choose only one)

As an instructional designer you will want to determine if a specific task (or subtask) is highly important, of medium importance, or would actually be considered as being at a low level of importance.

Column 7: Difficulty (**H, M, L**)

Instructions: Mark the column with **H** (**H**igh), **M** (**M**edium), or **L** (**L**ow) (choose only one)

Similar to Importance, the instructional designer will want to determine the "weight" of the level of difficulty for the specific task. This my impact the amount of time, or placement, or degree of support needed within the instructional project in order to accomplish this task.

Table 9

Task Analysis: Task D03 RLO 3: Service-Learning Case Study

Task/Sub-task	Knowledge Type (**D, P, S**)	Prerequisite (**Y/N**)	Environmental Factors (**T, E, M, P, L**)	Domain Type	Importance	Difficulty
Objective3: Given instruction on addition and subtraction of polynomials, Students will demonstrate the ability to create a service learning component within a technology work project at the criterion of 90% as measured by a product rubric.						
Task 3.1: Define Service-learning Evaluation	D	Y	T, M, L	C	H	H
Task 3.2: State an example of MOE Recruitment Brochure	D	Y	T, M, L	C	H	H
Task 3.3: State an advanced example of the maintenance support of information and network environment	D	Y	T, M, L	C	H	H
Task 3.4: State an advanced example of assisting rural community cultural collection	D	Y	T, M, L	C	H	H
Task 3.5: State an advanced example of assisting villagers for information accomplishment training	D	Y	T, M, L	C	H	H
Task 3.6: State an advanced example of applying (parent-child) camp activities	D	Y	T, M, L	C	H	H
Task 3.7: State an advanced example of assisting rural community industry marketing	D	Y	T, M, L	C	H	H
Task 3.8: State an advanced example of assisting students in after-school learning	D	Y	T, M, L	C	H	H
Task 3.9: State an advanced example	D	Y	T, M, L	C	H	H

Task/Sub-task	Knowledge Type (**D, P, S**)	Prerequisite (**Y/N**)	Environmental Factors (**T, E, M, P, L**)	Domain Type	Importance	Difficulty
of Questions and Answers related Service-Leaning						
Task3.10: Demonstrate an advanced combined example of a technology work project related service-learning	S	Y	T,E, M, L	C	H	H

Explanation of Terms (Legend):

Column 2: Knowledge Type (**D, P, S**)

Instructions: Mark the column with D, P, or S (choose only one knowledge type)

According to Jonassen (1999), there are three types of knowledge for an Instructional Designer to consider: (1) Declarative (**D**), (2) Procedural (**P**), and (3) Structural (**S**).

Declarative Knowledge is defined as factual knowledge (e, g., the capital of Florida is Tallahassee), and may be thought of in at least two ways: episodic (knowledge is organized by where, when, who) and semantic knowledge (knowledge of the meaning of words, facts, geography, and things that are classified). Declarative knowledge may also include information about concepts.

Procedural Knowledge is defined as a listing of "how" something is done (e.g., driving a car or preparing a recipe). This knowledge type details activities required to perform a specific task. Procedural Knowledge transforms detail tasks into a habitual process (e.g., fire drill instructions, pre-flight check list).

Structural Knowledge is defined as the linking of one concept to another in order to solve a problem, generate a plan or a strategy by setting conditions for a set of procedures.

Column 3: Prerequisite

Instructions: Mark the column with **Y** (yes) or **N** (no) (choose only one)

If prerequisite knowledge or skills are required in order to complete the task (e.g., A student cannot add 3+2 unless the concept of the number 3 and 2 exist prior to the act of addition), then this should be identified in the worksheet.

Column 4: Environmental Factors (**T, E, M, P, L**)

Instructions: Mark the column with **T** (**T**ime), **E** (**E**nvironment), **M** (**M**edia), **P** (**P**hysical condition), or **L** (**L**earning environment) (multiple factors may apply; choose accordingly)

Time is the estimated time to complete the task. (You will use this estimate to compare actual student time to complete the task. The difference between these two quantities (e.g., estimated time 23 min, actual time 36 min, difference 13 minutes) may result in instructional changes to improve performance.

Environment: Examine the literature to see what environmental concerns are related to the specific task requirements. You may also need to consult with one, or more, instructional experts to gain insight.

Media: What is the best media that will assist in the targeted learners in completing the task? You may need to consider your response to the Environment issue (see above) since this may impose conditions on the media that is best given any environmental constraints.

Physical Condition: These are not the same as Environmental issues (see Watson, 1997: *Task Analysis: An Occupational Performance Approach*. Bethesda, MD: The American Occupational Therapy Association). You may wish to examine Card, Moran, and Newell (1983) in relation to GOMS (Goals, Operators, Methods, Selection) in job task analysis for business, industry, and government.

Learning environment: Considerations should include connectivity, type of hardware/software and peripherals, user interface designs for computer assisted Instruction and distance learning interfaces.

Column 5: Domain (**C, M, A, MO**)

Instructions: Mark the column with **C** (**C**ognitive), **M** (**M**otor), **A** (**A**ffective), or **MO** (**Mo**tivation) (choose only one)

The terms Cognitive, Motor, and Affective are related to Gagne's taxonomy of learning outcomes and are somewhat similar to Bloom's taxonomies of cognitive, affective, and psychomotor outcomes.

Motivation refers to Maslow's Hierarchy of Needs:

Self-Actualization (reaching one's maximum potential)

Esteem (respect from others, self-respect, recognition)

Belonging (affiliation, acceptance, being part of something)

Safety (physical safety, psychological security)

Physiological (hunger, thirst, rest)

Column 6: Importance (**H, M, L**)

Instructions: Mark the column with **H** (**H**igh), **M** (**M**edium), or **L** (**L**ow) (choose only one)

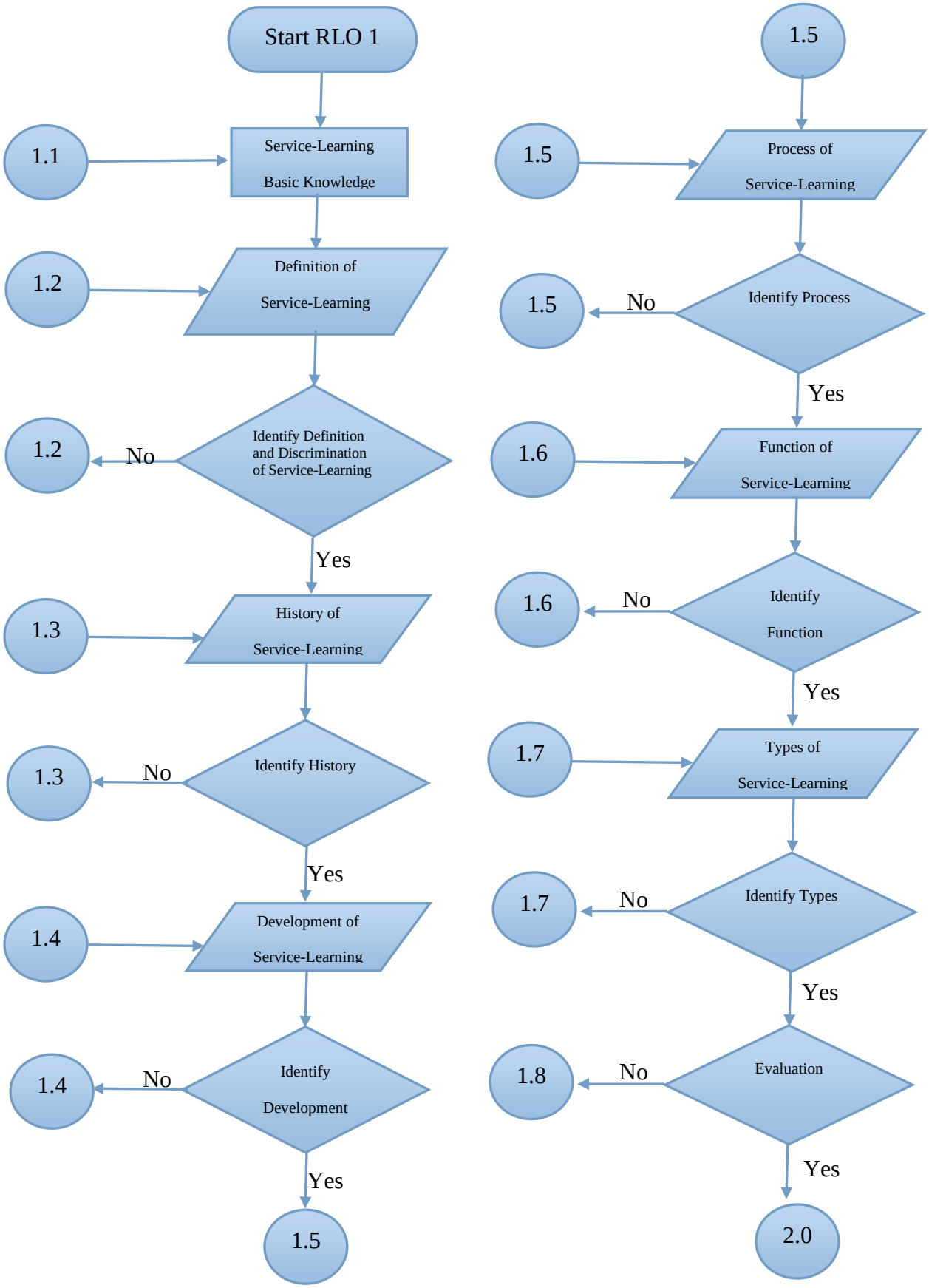
As an instructional designer you will want to determine if a specific task (or subtask) is highly important, of medium importance, or would actually be considered as being at a low level of importance.

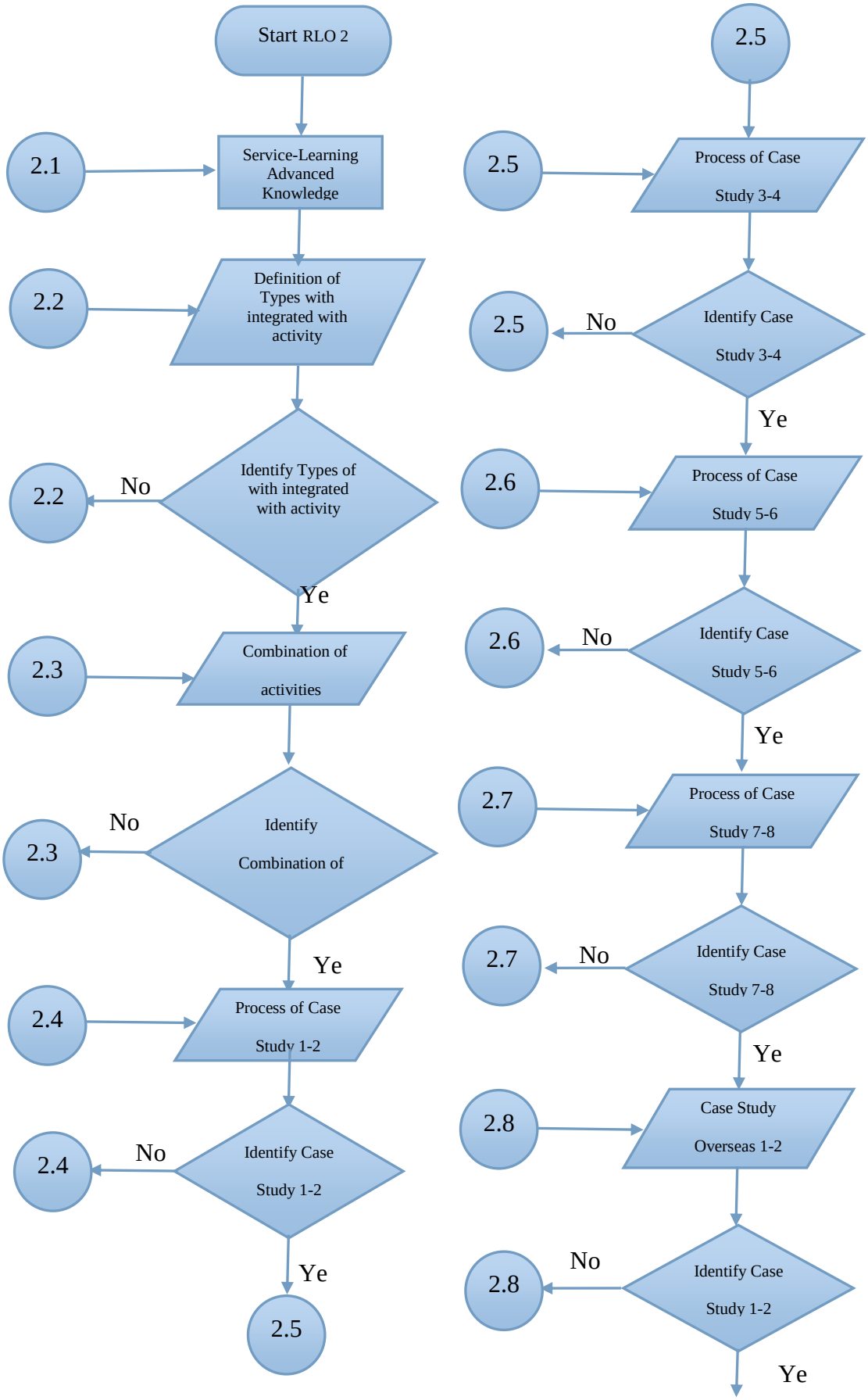
Column 7: Difficulty (**H, M, L**)

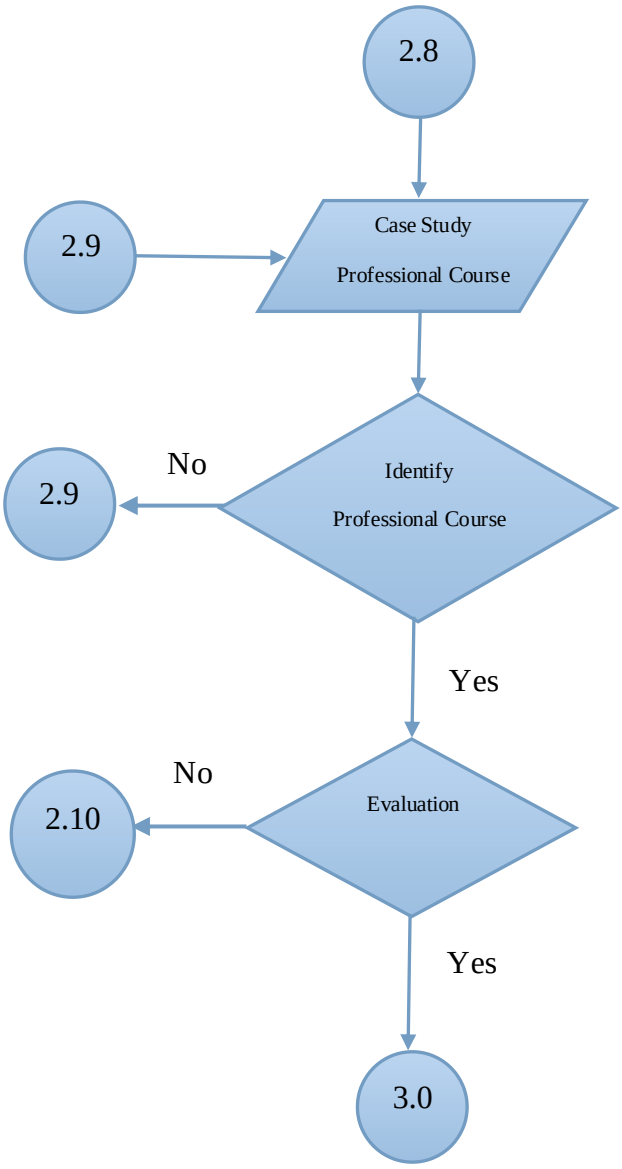
Instructions: Mark the column with **H** (**H**igh), **M** (**M**edium), or **L** (**L**ow) (choose only one)

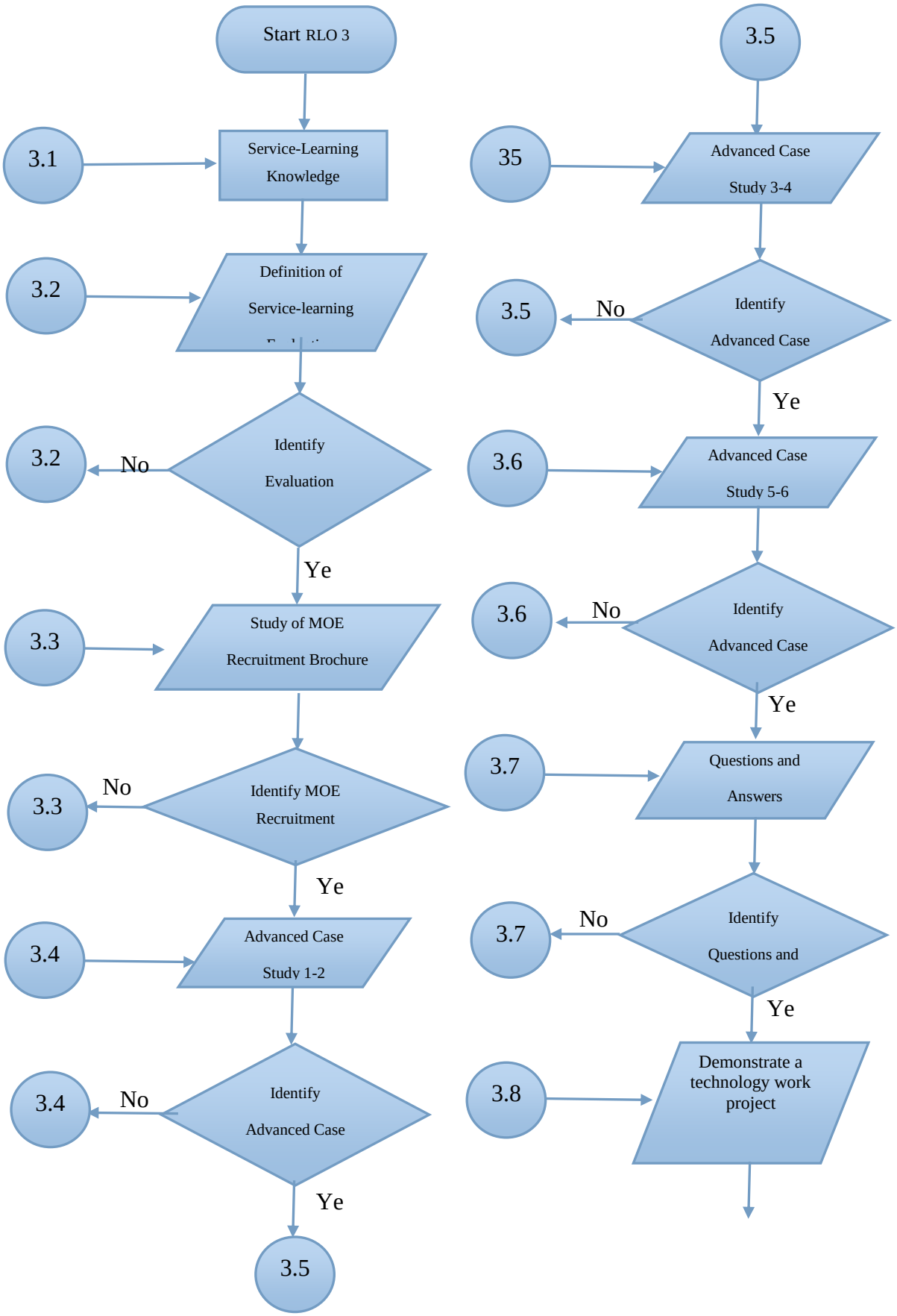
> Similar to Importance, the instructional designer will want to determine the "weight" of the level of difficulty for the specific task. This my impact the amount of time, or placement, or degree of support needed within the instructional project in order to accomplish this task.

Task D02: Flowcharts with Content and Delphi 6. The flowcharts served as visual representations depicting each step in the project in relationship to the Goal and Objectives (see Figure 5 for representative flowcharts; complete flowcharts are available in digital format). The panel of three instructional design experts (IDEs) was asked to determine the face validity of the flowcharts in alignment with the objectives and tasks, including appropriate assessment points within the project (see Appendix D for the Delphi Survey 6). Table 7 in Chapter 4 present the summary data from this review. (See Appendix G for the tables of raw data.)


Start RLO 1
1.1
Service-Learning
Basic Knowledge
1.2
Definition of
Service-Learning
1.2
No
Identify Definition
and Discrimination
of Service-Learning
Yes
1.3
History of
Service-Learning
1.3
No
Identify History
Yes
1.4
Development of
Service-Learning
1.4
No
Identify
Development
Yes
1.5
1.5
1.5
Process of
Service-Learning
1.5
No
Identify Process
Yes
1.6
Function of
Service-Learning
1.6
No
Identify
Function
Yes
1.7
Types of
Service-Learning
1.7
No
Identify Types
Yes
1.8
No
Evaluation
Yes
2.0


Start RLO 2
2.1
Service-Learning Advanced Knowledge
2.2
Definition of Types with integrated with activity
2.2
No
Identify Types of with integrated with activity
Ye
2.3
Combination of activities
2.3
No
Identify Combination of
Ye
2.4
Process of Case Study 1-2
2.4
No
Identify Case Study 1-2
Ye
2.5
2.5
Process of Case Study 3-4
2.5
No
Identify Case Study 3-4
Ye
2.6
Process of Case Study 5-6
2.6
No
Identify Case Study 5-6
Ye
2.7
Process of Case Study 7-8
2.7
No
Identify Case Study 7-8
Ye
2.8
Case Study Overseas 1-2
2.8
No
Identify Case Study 1-2
Ye


2.8
2.9
Case Study
Professional Course
No
2.9
Identify
Professional Course
Yes
No
2.10
Evaluation
Yes
3.0


Start RLO 3
3.1
Service-Learning Knowledge
3.2
Definition of Service-learning
3.2
No
Identify Evaluation
Ye
3.3
Study of MOE Recruitment Brochure
3.3
No
Identify MOE Recruitment
Ye
3.4
Advanced Case Study 1-2
3.4
No
Identify Advanced Case
Ye
3.5
3.5
35
Advanced Case Study 3-4
3.5
No
Identify Advanced Case
Ye
3.6
Advanced Case Study 5-6
3.6
No
Identify Advanced Case
Ye
3.7
Questions and Answers
3.7
No
Identify Questions and
Ye
3.8
Demonstrate a technology work project

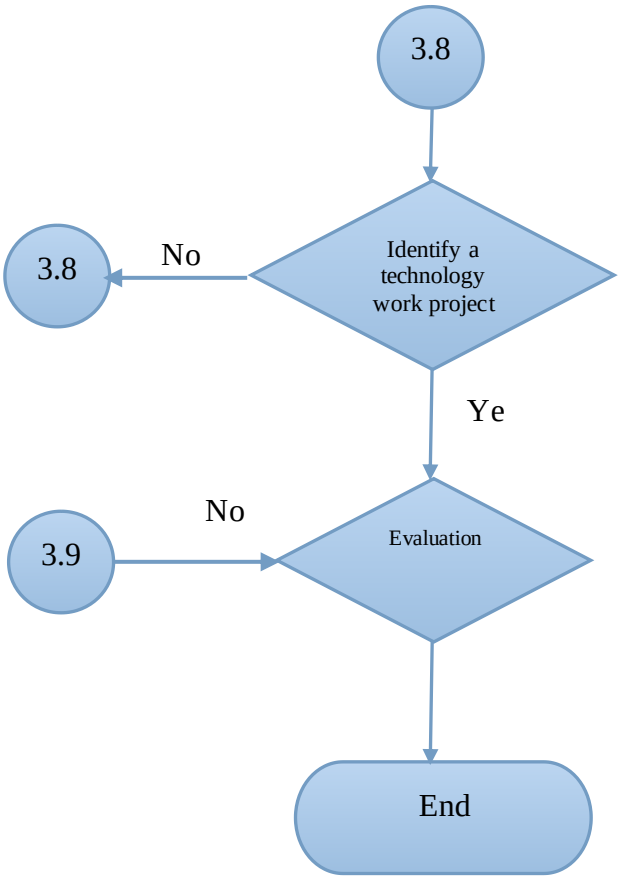


Figure 5. Representative flowcharts

Task D03: Storyboards and Delphi 7. In this phase, the researcher created storyboards (see Figure 6 for representative screen captures) that corresponded to the service-learning model and related these to the flowcharts (Task D02). The storyboards included text, graphics, and hypertext links as needed. The SMEs judged the content validity of this phase (see Appendix D for the Delphi instrument) as related to the interface and multimedia design elements. The summary data is provided in Table 8.

Service-Learning Modules in Moodle system (http://moodle-25.mcu.edu.tw/course/view.php?id=763&lang=en)	**M1L1S1(module 1, lesson 1, screen 1)**
	Service-Learning Learning System on line course is over here by Moodle. There are RLO 1, RLO 2, and RLO 3" to hyperlink learning modules for students.
Each menu title will be internally hyper-linked to the appropriate information screen(s) If user clicks "Service-Learning Project Designing Course 1 ", go to ROL1 hyperlinks. If user clicks ""Service-Learning Project Designing Course 2 ", go to ROL2 hyperlinks. If user clicks ""Service-Learning Project Designing Course 3 ", go to ROL3 hyperlinks.	Misc Notes can go here

Service-Learning Project Designing Course 1 (http://moodle-25.mcu.edu.tw/course/view.php?id=763&lang=en)	**M1L1S1(module 1, lesson 1, screen 2)**
	Service-Learning Learning System on line course is over here by Moodle. There are RLO 1 to hyperlink five learning classes for students.
Each menu title will be internally hyper-linked to the appropriate information screen(s) If user clicks “the Development of Service-Learning”, go to development content hyperlinks. If user clicks ““the Process of Service-Learning”, go to process content hyperlinks. If user clicks ““the Function of Service-Learning”, go to function hyperlinks. If user clicks ““ the Types of Service-Learning”, go to types content hyperlinks. If user clicks ““Unit Evaluation”, go to question bank hyperlinks.	Misc Notes can go here

Service-Learning Gas Station (http://service-learning2015.blogspot.tw/)	**M1L1S3(module 1, lesson 1, screen 3)**
	Service-Learning content on line course is over here. There are "What is service-learning?" and "the relationship of service and learning".
Each menu title will be internally hyperlinked to the appropriate information screen(s) If user clicks "Service-Learning Moodle", go to Experimental Students log in site. If user clicks "MOE Service-Learning web sites", go to Service-Learning activities in Ministry of Education website If user clicks "America Association of Community Colleges", go to The American Association of Community Colleges (AACC) If user clicks "National Service-Learning Clearinghouse", go to The Clearinghouse is the Nation's #1 library of service-learning resources. If user clicks"MST Service-Learning web sites", go to The MOST promotes science education research.	Misc Notes can go here

Figure 6. Representative screen captures of project storyboards

Task D04: Assessment Instruments and Delphi 08 and Delphi 09. The researcher created an assessment instrument: a proposal rubric (see Appendix F for the SLTPP rubric). SMEs examined all assessment instruments using the Delphi Method. The summary data from Delphi 8 (see Appendix E for the Delphi 8 instrument) is displayed in Table 9 of Chapter Four. The summary data from Delphi 9 (see Appendix E for the Delphi 9 instrument) is displayed in Table 10 of Chapter Four.

Task D05: Field-Test of Assessment Instruments. The researcher administered the content assessment to a small group of students who were comparable to the targeted participants for this study. Based on the feedback received, the researcher revised, where needed.

Task D06: Field-test of Prototype. The last task in the Design phase centered on a prototype for the service-learning project. Following the ADDIE model, a field test consisting of a small group of subjects who represented the targeted participants in the proposed research study was done. The researcher revised elements related to content and instructional plans based on data from this field test prior to actual implementation with the targeted research participants.

Appendix C

Consent Form

Consent to Participate in a Research Study

I am Mr. Wei-Lun Li, an EdD candidate in Educational Leadership (Instructional Technology emphasis) at Idaho State University, conducting research for my dissertation. The purpose of this research is to establish protocols, including assessment measures, for the service-learning project requirements as established by the Ministry of Education of Taiwan.

You are being asked to participate in this study to determine if a technology-based service-learning project can meet the MOE's expectations for building connections between community and school entities. The normal requirements as established by the MOE will be followed. The only change to this will be in the use of technology to learn the content about service-learning and to create the project proposal.

Your participation in the collection of research data and the use of technology is voluntary. You may elect to learn the service-learning content in a traditional classroom without using technology. However, as a registered student in the course, all content, products, and assessments that are normally expected by your teacher will not be altered.

Results from my research study will not identify you by name or any other method; only anonymous data will be reported.

Please acknowledge your participation in this study or whether you decline to participate by checking the appropriate box below. If you agree to participate, please include your printed name, the date, and sign where indicated.

If you have questions regarding this proposed research study, please contact me via email (liweil2@isu.edu) or my dissertation advisor, Dr. Jane Strickland (strijane@isu.edu).

Thank you for your consideration as a participant in my important doctoral work!

Sincerely,

Wei-Lun (William) Li

☐ I do not wish to participant in Wei-Lun Li's doctoral research study.

☐ I agree to participant in Wei-Lun Li's doctoral research study.

Printed Name	Date	Signature

Appendix D

Research Question 1 Instrument

(Delphi Survey 1- Delphi Survey 7)

Delphi Survey 1

In order to best represent your feedback on the project, I ask that you proceed as follows:

1. Carefully and thoroughly review the documents attached related to the project's rationale, the goal, and the objectives.
2. Mark the rating that most represents your expert evaluation for each item in the survey.
3. Return your completed instrument via reply email as an attachment no later than month ,day, year.

Item	Strongly Disagree 1	Disagree 2	Agree 3	Strongly Agree 4
Project Rationale (Task A01):				
1. The benefit of this project to the institution or organization is clearly stated.				
2. The benefit of this project to the targeted learners is clearly stated.				
3. The need for this project is clearly stated.				
4. The geographical scope for this project is clearly stated.				
5. The project's subject matter is clearly stated.				
6. The project's approach to the problem is clearly stated.				
7. The project's expected outcome is clearly stated.				

Item	Strongly Disagree 1	Disagree 2	Agree 3	Strongly Agree 4
Project Goal(s) (Task A02):				
8. The goal(s) of this project is clearly stated.				
9. The goal(s) of this project states what the project is to accomplish.				
10. The goal(s) of this project clearly indicates how the success will be indicated.				
11. The goal(s) of this project appears to be achievable.				
12. The goal(s) of this project appears to be significant to the field of knowledge indicated by the rationale.				
13. The goal(s) of this project appears to be measurable.				
14. Considering the target population, the goal(s) of this project appears to be realistic.				
15. The outcomes of the project appear to be obtainable.				
Project Objectives (Task A03):				
16. Each objective of this project module is aligned to the goal statement.				
17. Each objective of this project module contains a behavior/action verb that is measurable.				
18. Each objective of this project module has an identified audience.				

Item	Strongly Disagree 1	Disagree 2	Agree 3	Strongly Agree 4
19. Each objective of this project module contains a degree/constraint that is clearly stated.				
20. Each objective of this project module contains a condition/situation that is clearly stated.				
21. Each objective of this project is aligned to the identified audience.				

德菲調查法 1

為了更好地代表您對項目的反饋意見，我要求您按照以下步驟進行：

1.仔細審查與項目概念圖相關的文件，學習影響，預期學習成果和學習層次.

2.將最多代表您對專業評估的評價標記為調查中的每個項目.

3.通過電子郵件以附件方式回覆您完成的調查工具，不得遲於年，月，日.

項目	非常不同意 1	不同意 2	同意 3	非常同意 4
專案理由 (Task A01):				
1. 這個專案對機構或組織的好處是明確的.				
2. 這個專案對目標學員的好處是明確的.				
3. 這個專案的需要是明確的.				
4. 該項目專案的地理範圍明確.				
5. 專案的主題明確.				
6. 該專案的方法是明確的.				
7. 該專案的預期成果明確.				
專案**目標 (Task A02):**				
8. 這個專案的目標是明確的.				
9. 這個專案的目標是說明何種項目是要完成的。				
10. 這個專案的目標清楚地表明瞭如何表明成功				

項目	非常不同意 1	不同意 2	同意 3	非常同意 4
11. 這個專案的目標似乎是可以實現的.				
12. 這個專案的目標似乎對於理論指導的知識領域是重要的.				
13. 這個專案的目標似乎是可衡量的.				
14. 考慮到目標人群，這個專案的目標似乎是切實的.				
15. 專案的成果似乎是可以獲得的.				
專案目標 (Task A03):				
16. 該專案模組的每個目標都符合目標聲明.				
17. 該專案模組的每個目標包含可衡量的行為/動作動詞.				
18. 該專案模組的每個目標都有一個確定的受眾.				
19. 該專案模組的每個目標都包含明確規定的程度/約束.				
20. 該專案模組的每個目標都包含明確說明的條件/情況.				
21. 這個專案的每一個目標都與確定的受眾一致.				

Delphi Survey 2

In order to best represent your feedback on the project, I ask that you proceed as follows:

1. Carefully and thoroughly review the documents attached related to the project's concept map, learning influences, expected learning outcomes, and learning hierarchy.
2. Mark the rating that most represents your expert evaluation for each item in the survey.
3. Return your completed instrument via reply email as an attachment no later than month day, year.

Item	**Strongly Disagree 1**	**Disagree 2**	**Agree 3**	**Strongly Agree 4**
Learning Outcomes Statement (Task A04):				
1. There is an accurate description of the short-term learning effect for each of the objectives for each RLO/Module.				
2. There is an accurate description of the long-term learning effect for each of the objectives for each RLO/Module.				
3. There is an accurate description of how the learner is expected to change as a result of each objective.				
4. There is an accurate description of what is expected to change as a result of the instruction.				
Learning Hierarchy w/ Content Map (Task A05):				
5. It appears the concept map accurately presents each goal of the project. (Refer to				

Item	Strongly Disagree 1	Disagree 2	Agree 3	Strongly Agree 4
Task A02 for the goal(s), if needed.)				
6. It appears the concept map accurately presents each of the primary objectives. (Refer to Task A03 for the objectives, if needed.)				
7. Using the project goal(s) and the project objectives [Task A02 and Task A03] as references, it appears the concept map accurately links each goal with its corresponding primary objective(s).				
8. Using the project objectives as reference, it appears the concept map accurately presents each of the secondary objectives.				
9. Using the project objectives as reference, it appears the concept map accurately links each of the secondary objectives to its corresponding primary objective.				
10. The total concept map presents an accurate depiction of the project.				
11. The total concept map displays appropriate linkages among all elements.				
12. The essential prerequisite learner knowledge/skills to achieve the objectives are identified.				
13. The hierarchic map provides accurate graphical representation of the prerequisite knowledge/skills the learner is to achieve before commencing work on this project's objectives.				

Item	Strongly Disagree 1	Disagree 2	Agree 3	Strongly Agree 4
Learner Influence Document (Task A06):				
14. There is an accurate description for gaining the learner's attention within each RLO/Module.				
15. There is an accurate description for maintaining the learner's attention within each RLO/Module.				
16. There is an accurate description for assessing the learner's satisfaction within the instruction for each RLO/Module.				
17. There is an accurate description of how each RLO/Module will include a focus on specific learner capabilities.				
18. There is an accurate description of how each RLO/Module will stimulate the learner's prerequisite knowledge (or skills).				
19. There is an accurate description of how each RLO/Module will accommodate identified learner disabilities.				
20. There is an accurate description of how each RLO/Module will respond to a participant's particular learning traits.				

德菲調查法 2

為了更好地代表您對項目的反饋意見，我要求您按照以下步驟進行：

1．仔細審查與項目概念圖相關的文件，學習影響，預期學習成果和學習層次.

2．將最多代表您對專業評估的評價標記為調查中的每個項目.

3．通過電子郵件以附件方式回覆您完成的調查工具，不得遲於年，月，日.

項目	非常不同意 1	不同意 2	同意 3	非常同意 4
學習成果聲明 (Task A04):				
1．對於每個 RLO / Module 的每個目標，都有準確的描述短期學習效果.				
2．對每個 RLO / Module 的每個目標的長期學習效果都有準確的描述.				
3．準確描述學習者如何因每個目標而改變.				
4．有一個準確的預期會改變什麼描述，作為指導的結果				
內容地圖與學習層次 (Task A05):				
5．概念圖準確地呈現了專案的每個目標。（如果需要，請參閱任務 A02 的目標。）				
6．概念圖似乎準確地呈現了每個主要目標。（如果需要，請參閱任務 A03 的目標。）				
7．使用專案目的和專案目標[任務 A02 和任務 A03]作為參考，概念圖準確地將每個目標與其相應的主要目標做相關聯。				

項目	非常不同意 1	不同意 2	同意 3	非常同意 4
8. 使用專案目標作為參考，似乎概念圖準確地呈現了每個次要目標.				
9. 使用專案目標作為參考，似乎概念圖將每個次要目標準確地鏈接到其相應的主要目標.				
10. 總概念圖顯示了專案的準確描述.				
11. 總概念圖顯示所有元素之間的適當聯繫.				
12. 去實現目標基本先決條件的學習者知識/技能有被確定.				
13. 分級地圖提供了學習者在開始該項目目標之前要實現必備知識/技能的準確圖形表示.				
學習者影響文件 (Task A06):				
14. 在每個 RLO / Module 中有一個準確的描述來獲得學習者的注意力.				
15. 在每個 RLO / Module 中有一個準確的描述來維持學習者的注意力.				
16. 在每個 RLO /模組的指導中，有一個準確的描述來評估學習者的滿意度.				
17. 有一個準確的描述，每個 RLO /模組將如何將重點放在具體的學習者能力.				
18. 準確描述每個 RLO / Module 如何激發學習者的先決知識（或技能）.				

項目	非常不同意 1	不同意 2	同意 3	非常同意 4
19. 有關每個 RLO / Module 如何適應已識別學習者殘障的準確描述.				
20. 準確描述每個 RLO / Module 將如何響應參與者的特定學習特徵.				

Delphi Survey 3

In order to best represent your feedback on the project, I ask that you proceed as follows:

1. Carefully and thoroughly review the documents attached related to the project's targeted learner characteristics, audience, constraints, and pedagogical considerations.
2. Mark the rating that most represents your expert evaluation for each item in the survey.
3. Return your completed instrument via reply email as an attachment no later than month day, year.

Item	**Strongly Disagree 1**	**Disagree 2**	**Agree 3**	**Strongly Agree 4**
Learner Characteristics Profile (Task A07):				
1. It appears the general characteristics accurately describe the target population of the project.				
2. It appears the age range accurately represents target population of the project				
3. It appears the gender distribution accurately represents target population of the project				
4. It appears the ethnic/cultural distribution accurately represents target population of the project				
5. It appears the language distribution accurately represents target population of the project				
6. It appears the entry behavior is appropriate for target population of the project				
7. It appears the time frame for completion is reasonable for target population of the project				
8. It appears the list of prior knowledge needed for completion of the project is				

Item	Strongly Disagree 1	Disagree 2	Agree 3	Strongly Agree 4
complete.				
9. It appears the statement of prerequisite cognitive skills for completion of the project is complete.				
10. It appears the statement of prerequisite motor skills for completion of the project is complete.				
Pedagogical Considerations Statement (Task A08):				
11. It appears that the Pedagogical Considerations Statement has addressed issues regarding instructional sequencing.				
12. It appears that the Pedagogical Considerations Statement has addressed issues regarding instructional motivation.				
13. It appears that the Pedagogical Considerations Statement has addressed issues student-centered learning.				
14. It appears that the Pedagogical Considerations Statement has addressed issues regarding use of an advance organizer or some system to clarify the instructional goals and objectives of the project				

德菲法調查 3

為了更好地代表您對項目的反饋意見，我要求您按照以下步驟進行：

1．仔細審查與項目概念圖相關的文件，學習影響，預期學習成果和學習層次.

2．將最多代表您對專業評估的評價標記為調查中的每個項目.

3．通過電子郵件以附件方式回覆您完成的調查工具，不得遲於年，月，日.

項目	非常不同意 1	不同意 2	同意 3	非常同意 4
學習者特徵簡介 (Task A07):				
1． 一般特徵準確描述了專案的目標人群.				
2． 似乎年齡範圍準確地表示了專案的目標人群				
3． 似乎性別分佈準確地表示了專案的目標人群				
4． 似乎民族/文化分佈準確地代表了專案的目標人群				
5． 語言分佈似乎準確地表示了專案的目標人群				
6． 似乎進入行為適合於項目的專案人口				
7． 對於專案的目標人群來說，完成時間似乎是合理的				
8． 似乎完成專案完成所需的先前知識清單				
9． 認識技能完成的先決條件似乎完成.				
10．運動技能完成的先決條件似乎完成.				
教學注意事項聲明 (Task A08):				

項目	非常不同意 1	不同意 2	同意 3	非常同意 4
11. 教學注意事項聲明已經解決了有關教學排序的問題.				
18. 似乎 教學考慮聲明"已經解決了有關教學動機的問題.				
19. 教學注意事項聲明已經解決了以學生為中心的學習問題.				
20. 教學注意事項聲明已經解決了使用預先組織者或一些系統來澄清專案的教學目標和目標的問題				

Delphi Survey 4

In order to best represent your feedback on the project, I ask that you proceed as follows:

1. Carefully and thoroughly review the documents attached related to the project's learning environment and delivery options.
2. Mark the rating that most represents your expert evaluation for each item on the survey.
3. Return your completed instrument via reply email as an attachment no later than month day, year.

Item	Strongly Disagree 1	Disagree 2	Agree 3	Strongly Agree 4
Learner Constraints Statement (Task A09):				
1. It appears the learner constraints (e.g. Time, budget, user preferences, organizational culture, available technology) have been reasonable addressed for target population of the project.				
2. It appears the learner constraints regarding ADA considerations have been reasonable addressed for target population of the project.				
3. It appears the learner constraints regarding network software have been reasonable addressed for target population of the project.				
Learning Environment & Delivery Options Statement (Task A10):				
4. It appears the specific hardware requirements have been accurately described for the project.				
5. It appears the specific requirements to navigate the content materials have been accurately described for the project.				

Item	Strongly Disagree 1	Disagree 2	Agree 3	Strongly Agree 4
6. It appears the specific software requirements have been accurately described for the project.				
7. It appears the specific learner requirements have been accurately described for the project.				
8. It appears the specific learner requirements for students with physical disabilities have been accurately described for the project.				
9. It appears the specific delivery plan for content activities has been accurately described for the project.				
10. It appears the specific delivery plan for content assessments has been accurately described for the project.				
11. It appears the specific delivery plan for content assessment feedback has been accurately described for the project.				
12. It appears the specific delivery plan for student-to-instructor communication has been accurately described for the project.				
13. It appears the specific learner requirements for students with English as a second language have been accurately described for the project.				
14. It appears the specific learner requirements for students with cognitive disabilities have been accurately described for the project.				
15. It appears the specific delivery plan for content assignments has been accurately described for the project.				

德菲法調查 4

為了更好地代表您對項目的反饋意見，我要求您按照以下步驟進行：

1. 仔細審查與項目概念圖相關的文件，學習影響，預期學習成果和學習層次.

2. 將最多代表您對專業評估的評價標記為調查中的每個項目.

3. 通過電子郵件以附件方式回覆您完成的調查工具，不得遲於年，月，日.

項目	非常不同意 1	不同意 2	同意 3	非常同意 4
學習者限制聲明 (Task A09):				
1. 似乎學習者限制（例如時間，預算，用戶偏好，組織文化，可用技術）對於專案的目標人群已被合理地解決了.				
2. 有關 ADA 考慮的學習者似乎對專案的目標人群進行了合理的解決.				
3. 針對專案的目標人群,對於網路軟體的學習者限制已經被合理地解決了.				
學習環境與傳送選擇聲明 (Task A10):				
4. 似乎已經準確地描述了專案的具體硬體要求.				
5. 對於專案來說，導航內容材料的具體要求似乎已被準確描述.				
6. 似乎已經準確描述了專案的具體軟體需求.				
7. 似乎為專案特殊的學習者需求已被準確描述.				
8. 對於殘障學生來說，具體的學習者要				

項目	非常不同意 1	不同意 2	同意 3	非常同意 4
求已被準確描述.				
9. 對於專案來說，內容活動的具體傳送計劃似乎已被準確描述.				
10. 對於專案來說，內容評估的具體傳送規劃似乎已被準確描述.				
11. 內容評估反饋的具體傳送計劃似乎已被準確描述.				
12. 對於專案來說，似乎正確地描述了學生到講師溝通的具體傳送計劃.				
13. 英語作為第二語言的學生，具體的學習者需求已被準確描述.				
14. 對於專案來說，對於認知障礙學生的具體學習要求似乎已被準確描述。				
15. 似乎為專案準確描述了內容分配的具體交付計劃。				

Delphi Survey 5

In order to best represent your feedback on the project, I ask that you proceed as follows:

1. Carefully and thoroughly review the documents attached related to the project's tasks and subtasks (if included).
2. Mark the rating that most represents your expert evaluation for each item in the survey.
3. Return your completed instrument via reply email as an attachment no later than month day, year.

Item	**Strongly Disagree 1**	**Disagree 2**	**Agree 3**	**Strongly Agree 4**
1. The objectives for the tasks are clearly stated.				
Project Tasks:				
1. The listed tasks are aligned with each objective.				
2. The knowledge identification types are aligned with each task.				
3. The prerequisite decisions (Y/N) are aligned with each task.				
4. The environmental factors identified are aligned with each task.				
5. The domain types are aligned with each task.				
6. The importance levels are aligned with each				

Item	Strongly Disagree 1	Disagree 2	Agree 3	Strongly Agree 4
task.				
7. The difficulty levels are aligned with each task.				
Project Sub-tasks (if included):				
8. The listed sub-tasks appear to be aligned with the tasks.				
9. The knowledge identification types are aligned with each sub-task.				
10. The prerequisite decisions (Y/N) are aligned with each sub-task.				
11. The environmental factors are aligned with each sub-task.				
12. The domain types are aligned with each sub-task.				
13. The importance levels are aligned with each sub-task.				
14. The difficulty levels are aligned with each sub-task.				

德菲法調查 5

為了更好地代表您對項目的反饋意見，我要求您按照以下步驟進行：

1．仔細審查與項目概念圖相關的文件，學習影響，預期學習成果和學習層次.

2．將最多代表您對專業評估的評價標記為調查中的每個項目.

3．通過電子郵件以附件方式回覆您完成的調查工具，不得遲於年，月，日.

項目	非常不同意 1	不同意 2	同意 3	非常同意 4
1．明確說明這些任務的目標.				
專案任務:				
2．列出的任務與每個目標一致.				
3．知識識別類型與每個任務對齊.				
4．先決條件（Y / N）與每項任務相一致.				
5．確定的環境因素與每個任務相一致.				
6．領域類型與每個任務對齊.				
7． 重要性級別與每項任務相一致.				
8．難度級別與每個任務對齊.				
專案子任務（如果包含）:				
9．列出的子任務似乎與任務對齊.				
10．知識識別類型與每個子任務對齊.				
11．先決條件（Y / N）與每個子任務對齊.				

項目	非常不同意 1	不同意 2	同意 3	非常同意 4
12. 環境因素與每個子任務對齊.				
13. 領域類型與每個子任務對齊.				
14. 重要性級別與每個子任務對齊.				
15. 難度級別與每個子任務對齊.				

Delphi Survey 6

In order to best represent your feedback on the project, I ask that you proceed as follows:

1. Carefully and thoroughly review the documents attached.
2. Mark the rating that most represents your expert evaluation for each item in the survey.
3. Return your completed instrument via reply email as an attachment no later than month day, year.

Item	**Strongly Disagree 1**	**Disagree 2**	**Agree 3**	**Strongly Agree 4**
1. Each objective for the module is represented in the flowchart.				
2. Appropriate content in support of each objective is represented in the flowchart.				
3. Assessments for each objective are represented in the flowchart.				
4. Appropriate decision points are represented in the flowchart.				
5. The content within the flowchart is appropriately sequenced for the module.				

德菲法調查 6

為了更好地代表您對項目的反饋意見，我要求您按照以下步驟進行：

1. 仔細審查與項目概念圖相關的文件，學習影響，預期學習成果和學習層次.

2. 將最多代表您對專業評估的評價標記為調查中的每個項目.

3. 通過電子郵件以附件方式回覆您完成的調查工具，不得遲於年，月，日.

項目	非常不同意 1	不同意 2	同意 3	非常同意 4
1. 流程圖中表示了模組的每個目標.				
2. 支持每個目標的適當內容在流程圖中表示.				
3. 流程圖中列出了每個目標的評估.				
4. 在流程圖中表示適當的決策點.				
5. 流程圖中的內容對於模組進行了適當的排序.				

Delphi Survey 7

In order to best represent your feedback on the project, I ask that you proceed as follows:

1. Carefully and thoroughly review the documents attached.
2. Mark the rating that most represents your expert evaluation for each item in the survey.
3. Return your completed instrument via reply email as an attachment no later than month day, year.

Item	**Strongly Disagree 1**	**Disagree 2**	**Agree 3**	**Strongly Agree 4**
1. There is a series of storyboards aligned with the flowcharts (Task D02).				
2. The placement for graphical elements is included in the storyboards.				
3. The type of graphical elements is identified in the storyboards.				
4. The size parameters of graphical elements are identified in the storyboards.				
5. The placement for textual elements is included in the storyboards.				
6. The font style for textual elements is included in the storyboards.				
7. The font size for textual elements is included in the storyboards.				

Item	Strongly Disagree 1	Disagree 2	Agree 3	Strongly Agree 4
8. Hypertext links (where needed) are indicated in the storyboards.				
9. The placement of hypertext links is indicated in the storyboards.				
10. Navigation buttons (where needed) are indicated in the storyboards.				
11. The placement of navigation buttons is indicated in the storyboards.				
12. The style of navigation buttons is indicated in the storyboards.				

德菲法調查 7

為了更好地代表您對項目的反饋意見，我要求您按照以下步驟進行：

1. 仔細審查與項目概念圖相關的文件，學習影響，預期學習成果和學習層次.

2. 將最多代表您對專業評估的評價標記為調查中的每個項目.

3. 通過電子郵件以附件方式回覆您完成的調查工具，不得遲於年，月，日.

項目	非常不同意 1	不同意 2	同意 3	非常同意 4
1. 有一系列故事板與流程圖一致 (Task D02).				
2. 圖形元素的位置包含在故事板中.				
3. 圖形元素的類型在故事板中被識別.				
4. 圖形元素的大小參數在故事板中被識別.				
5. 文本元素的位置包含在故事板中.				
6. 文本元素的字體樣式包含在故事板中.				
7. 文本元素的字體大小包含在故事板中.				
8. 超文本鏈接（如果需要）在故事板中顯示.				
9. 超文本鏈接的放置在故事板中顯示.				
10. 導航按鈕（需要時）在故事板中顯示.				
11. 導航按鈕的放置在故事板中顯示.				

項目	非常不同意 1	不同意 2	同意 3	非常同意 4
12. 導覽按鈕的風格在故事板中顯示.				

Appendix E

Research Question 2 Instrument

(Delphi Survey 8- Delphi Survey 9)

Delphi Survey 8

Service-Learning Technology Project Proposal Rubric

In order to best represent your feedback on the project, I ask that you proceed as follows:

1. Carefully and thoroughly review the documents attached related to the project's targeted learner characteristics, audience, constraints, and pedagogical considerations.
2. Mark the rating that most represents your expert evaluation for each item in the survey.
3. Return your completed instrument via reply email as an attachment no later than month day, year.

Item	Strongly Disagree 1	Disagree 2	Agree 3	Strongly Agree 4
1. It appears the Service-Learning integrated into the Curriculum & Instruction accurately describe the target Service-Learning Project Scoring Rubric of the project.				
2. It appears the Social Resources accurately describe the target Service-Learning Project Scoring Rubric of the project.				
3. It appears the Four Major Phases for Service-Learning accurately describe the target Service-Learning Project Scoring Rubric of the project.				
4. It appears the Community Need accurately describe the target Service-Learning Project Scoring Rubric of the project.				
4. It appears the Student Reflection accurately describe the target Service-Learning Project Scoring Rubric of the project.				

Item	Strongly Disagree 1	Disagree 2	Agree 3	Strongly Agree 4
6. It appears the Developing a sense of caring accurately describe the target Service-Learning Project Scoring Rubric of the project.				
7. It appears the Quality of life accurately describe the target Service-Learning Project Scoring Rubric of the project.				
8. It appears the The Follow-Up Plan(s) for the Community accurately describe the target Service-Learning Project Scoring Rubric of the project.				

德菲法調查 8

服務學習科技計劃建議評估

為了更好地代表您對項目的反饋意見，我要求您按照以下步驟進行：

1. 仔細審查與項目概念圖相關的文件，學習影響，預期學習成果和學習層次.

2. 將最多代表您對專業評估的評價標記為調查中的每個項目.

3. 通過電子郵件以附件方式回覆您完成的調查工具，不得遲於年，月，日.

項目	非常不同意 1	不同意 2	同意 3	非常同意 4
1. 看來服務學習整合到課程與教學中，準確地描述了目標服務學習專案的評分項目.				
2. 社會資源似乎準確描述了目標服務學習專案的評分項目.				
3. 看起來服務學習的四個主要階段準確描述了目標服務學習專案的項目評分.				
4. 社區需求似乎準確描述了計劃的目標服務專案項目評分.				
5. 學生反思似乎準確地描述了計劃的目標服務專案項目評分.				
6. 看來發展的關懷感準確地描述目標服務學習專案評分項目.				
7. 似乎生活質量準確地描述了目標的服務學習專案評分項目.				
8. 似乎社區的後續計劃正確地描述了目標服務學習專案的評分項目.				

Delphi Survey 9

SME Delphi Survey for Service-Learning Online Modules

Please indicate your level of agreement with each of the items below related to the proposed service-learning module content. Thank you!

Item	Strongly Disagree 1	Disagree 2	Agree 3	Strongly Agree 4
Instructional Content:				
1. The benefit of this project to the targeted learners is clearly stated.				
2. The number of reference websites for the service-learning module is adequate				
3. The reference cases for this project are clearly stated.				
4. The project's rubric items are clearly stated.				
5. The question bank for the module is aligned with the service-learning content.				
6. The question bank's item format is clearly measurable. (Multiple choice and Complex topics.)				
7. The learning objectives for each unit of this project are clearly stated.				
8. Each objective for this instructional content is aligned to the goal statement.				
9. Each objective of this instructional content is aligned to the identified audience.				

Item	Strongly Disagree 1	Disagree 2	Agree 3	Strongly Agree 4
10. The service-learning graphics (still images, video) on the blogger are aligned with the module's content.				
11. The technology tools students will use for the service-learning module are aligned with the targeted learners' technology experience.				

德菲法調查 9

服務學習線上模組

請您指出所提議的服務學習模組內容相關的每個項目的評分。 謝謝您！

項目	非常不同意 1	不同意 2	同意 3	非常同意 4
教學內容:				
1．這個專案對目標學習者的益處是明確的.				
2．服務學習模組的參考網站數量是足夠的.				
3．本專案的參考案例明確的被陳述.				
4．本專案的項目是明確的.				
5．該模組的題庫與服務學習內容是保持一致的.				
6．題庫的項目類型是可以被明顯衡量的(單選和複選題).				
7．本專案各單元的學習目標明確.				
8．這個教學內容的每個目標與目地陳述是一致的.				
9．這個教學內容的每一個目標都與識別的受眾一致.				
10．在部落格上的服務學習圖像（靜態圖像，視頻）與模組的內容一致.				
11．學生將用於服務學習模組的技術工具與目標學習者的技術經驗相一致.				

Appendix F

Research Question 3 Instrument

Service-Learning Project Scoring Rubric Assessment

	Strongly Disagree 1 pts	**Disagree 2 pts**	**Agree 3 pts**	**Strongly Agree 4 pts**
Service-Learning integrated into the Curriculum & Instruction This project proposal provides students with an opportunity to use the knowledge, skills, and dispositions acquired through the curriculum (IT) under instructor guidance in a real-world community setting.	The project proposal demonstrates little or no integration of service-learning curriculum principles to make a difference in the community setting. The service-learning project has no connection to instruction. The school and faculty advisor are unlikely to support this project proposal.	The project proposal demonstrates limited integration of service-learning curriculum principles to make a difference in the community setting. The service-learning project has a minimal connection to instruction. The school and faculty advisor may support this project proposal.	The project proposal demonstrates moderate integration of service-learning curriculum principles to make a difference in the community setting. The service-learning project has a strong connection to instruction. The school and faculty advisor may support this project proposal.	The project proposal demonstrates deep integration of service-learning curriculum principles to make a difference in the community setting. The service-learning project has a vital connection to instruction. The school and faculty advisor strongly support this project proposal.
Social Resources This project proposal strengthens the implementation for the community through integration of college and private sector resources.	The project proposal has little integration of college and private sector resources to strengthen the implementation.	The project proposal has limited integration of college and private sector resources to strengthen the implementation.	The project proposal has moderate integration of college and private sector resources to strengthen the implementation.	The project proposal has deep integration of college and private sector resources to strengthen the implementation.
Four Major Phases for	The project proposal	The project proposal	The project proposal	The project proposal fully

	Strongly Disagree 1 pts	**Disagree 2 pts**	**Agree 3 pts**	**Strongly Agree 4 pts**
Service-Learning This project proposal includes the 4 expected phases: (1) preparation; (2) service/ action; (3) reflection; (4) celebration.	includes one of the four phases expected.	includes two of the four phases expected.	includes three of the four phases expected.	documents all four expected phases.
Community Need This project proposal meets an actual need in the community and is coordinated through collaboration with the community.	There is no evidence of research or collaboration with the faculty advisor or community sponsor. The project proposal considers only the student's needs.	There is no evidence that research was used, but basic collaboration with the faculty advisor or community sponsor was employed is evident.	There is evidence that basic research and collaboration with the faculty advisor and the community sponsor were used.	There is evidence that extensive research and collaboration with the faculty advisor and the community sponsor were used.
Student Reflection This project proposal provides students an opportunity to reflect upon their own learning and their role in society.	Student exhibits no active reflection on service-learning and the planned project demonstrates little understanding of his/her role in society.	Student exhibits minimal reflection on service-learning and the planned project demonstrates little understanding of his/her role in society.	Student exhibits basic reflection on service-learning and the planned project demonstrates a basic understanding of his/her role in society.	Student exhibits deep reflection on service-learning and the planned project demonstrates enhanced understanding of his/her role in society.

	Strongly Disagree 1 pts	**Disagree 2 pts**	**Agree 3 pts**	**Strongly Agree 4 pts**
Developing a sense of caring This project proposal provides the student with the opportunity to develop a sense of caring for and about others.	The project proposal demonstrates the student is largely unaffected by the importance of service. The student is unlikely to serve again, even if asked.	The project proposal demonstrates limited understanding of the importance of service. The student may serve again, if asked.	The project proposal demonstrates a growing understanding of the importance of service in the student's ability to make a difference. The student may take the initiative to serve again.	The project proposal demonstrates deep personal understanding of the importance of service in the student's ability to make a difference. The student will likely take the initiative to serve again.
Quality of life This service project will provide the student the opportunity to enhance the quality of life for those individuals served.	The proposed service project is mainly decorative, but it provides limited benefit or does not offer anything new or unique to the selected community.	The proposed service project is mainly decorative, but it provides some benefit to the selected community.	The proposed service project facilitates limited change or insight; it will enhance a community situation that is not a major issue.	The proposed service project facilitates change or insight; helps solve a problem, meets a need, or addresses an issue in the selected community.
The Follow-Up Plan(s) for the Community This proposed project includes a maintenance plan for the selected community after the student's service-	The service-learning project does not provide a plan for community maintenance after the student's project ends.	The service-learning project provides an unclear plan for community maintenance after the student's project ends.	The service-learning project provides an adequate plan for community maintenance after the student's project ends.	The service-learning project provides a detailed plan for community maintenance after the student's project ends.

	Strongly Disagree 1 pts	**Disagree 2 pts**	**Agree 3 pts**	**Strongly Agree 4 pts**
learning involvement ends.				

服務學習項目評分量表評估

	最少的同意 1 分	些許的同意 2 分	好的同意 3 分	強烈的同意 4 分
服務學習融入課程與教學 該專案提案為學生提供了一個在現實社區環境中通過課程指導（IT）能夠獲得的知識，技能和處置的機會.	專案提案表明，很少或根本沒有整合服務學習課程原則，以改變社區環境。服務學習項目與教學無關. 學校和教師顧問不太可能支持這個專案建議.	專案提案表明服務學習課程原則的有限整合有助於改變社區環境。服務學習項目與教學的連接量很小. 學校和教師顧問可以支持這個專案建議.	專案提案表明服務學習課程原則的適度融合，使社區環境發生變化。服務學習項目與教學有很強的聯繫. 學校和教師顧問可以支持這個專案建議.	專案提案表明服務學習課程原則的深度整合，有助於改變社區環境。服務學習項目與指導有著重要的聯繫. 學校和教師顧問強烈支持這個專案建議.
社會資源 這個專案提案通過整合大學和私營部門的資源，加強了社區方案的實施。	專案建議書幾乎沒有融合院校和私營部門的資源來加強實施.	專案建議書限制了學院和私營部門資源的整合來加強實施.	專案建議適度融合學院和私營部門資源來加強實施.	專案建議書深入整合了院校與私營部門資源以便來加強實施.
服務學習的四個主要階段 本專案提案包括 4 個預期階段：（1）準備;（2）服務/行動;（3）反思;（4）慶祝活動.	專案建議書包括預期的四個階段之一.	專案建議書包括預期的四個階段中的兩個.	專案建議書包括預期的四個階段中的三個.	專案建議書全面說明了四個預期階段.
社區需求 該專案提案符合社區的實際需要，並通過與社區的合作進行協調	沒有與教師顧問或社區發起人進行研究或合作的證據。專案建議只考慮學生的需求。	沒有證據顯示使用研究，但是與教師顧問或社區贊助者的基礎合作是顯而易見的.	有證據表明，使用了與教師顧問和社區贊助者的基礎研究和協作.	有證據顯示，與教師顧問和社區贊助者進行了廣泛的研究和合作.

	最少的同意 1 分	些許的同意 2 分	好的同意 3 分	強烈的同意 4 分
.				
學生反思 這個專案提案為學生提供了一個反思自己的學習和在社會中作用的機會.	學生對服務學習沒有積極的反思，專案的項目對他/她在社會中的作用幾乎沒有了解.	學生對服務學習的反思很少，專案的項目對他/她在社會中的作用幾乎沒有理解.	學生展示了服務學習的基本思考，專案的項目對他/她在社會中的作用進行了基本的了解.	學生對服務學習表現出深刻的反思，專案的項目表明對他/她在社會中的作用有更多的了解.
發展關懷感 這個專案提案為學生提供了發展關心別人的機會。	專案建議表明，學生在很大程度上不受服務重要性的影響. 即使有問題，學生也不可能重新服務.	專案建議表明對服務重要性的理解有限. 如果問題，學生可以再次服務.	專案建議表明，越來越多的了解服務對學生改變能力的重要性.學生可以主動再次服務.	專案建議表明了深刻的個人理解服務在學生的能力上有所作為的重要性.學生可能會主動再次服務.
生活質感 這個服務專案將為學生提供那些被服務的人員提升生活品質的機會。	擬議的服務專案主要是裝飾性的，但它提供有限的利益或是也不提供任何新的或獨特的服務對所選定的社區.	擬議的服務專案 主要是裝飾性的，但為選定的社區提供了一些好處.	擬議的服務專案 有助於有限的變化或洞察力; 這將提升社情勢，但 這不是一個重大選項.	擬議的服務專案 有助於改變或洞察力; 有助於解決問題，滿足需求，或解決所選社區中的問題.
社區後續計劃 這個擬議的專案包括了在學生的服務學習參與結束後還選定社區後的維護計劃。	在學生專案結束後，服務學習專案並未提供社區維護計劃.	服務學習專案在學生專案結束後提供了一個不清楚的社區維護計劃.	在學生服務結束後,服務學習專案為社區維護提供了適當的計劃.	服務學習專案在學生專案結束後提供社區維護的詳細計劃.

Appendix G

Research Question 1 Results: Raw Data

(Delphi Survey 1-Delphi Survey 7)

Delphi Survey 1 Raw Data

Item	SME1	SME2	SME3	Total Scores
1	3	4	4	11
2	3	4	4	11
3	3	4	4	11
4	4	4	3	11
5	3	4	4	11
6	3	3	3	9
7	4	4	3	11
8	4	4	4	12
9	4	4	4	12
10	3	4	3	10
11	3	4	3	10
12	3	4	3	10
13	4	4	4	12
14	4	4	3	11
15	3	4	4	11
16	4	3	4	11
17	3	4	4	11
18	4	4	3	11
19	3	4	3	10
20	3	4	3	10
21	3	4	3	10

Item	SME1	SME2	SME3	Total Scores
Total	71	82	73	226
Mean	10.76			
Median	11			
SD	0.75			

Delphi Survey 2 Raw Data

Item	SME1	SME2	SME3	Total Scores
1	4	4	4	12
2	3	4	3	10
3	3	3	4	10
4	4	3	3	10
5	3	4	4	11
6	4	4	3	11
7	4	3	3	10
8	4	3	4	11
9	4	4	4	12
10	3	4	3	10
11	3	4	3	10
12	4	4	4	12
13	4	4	4	12
14	4	3	3	10
15	4	4	4	12
16	4	4	4	12
17	3	4	3	10
18	3	4	3	10
19	3	4	3	10
20	3	3	4	10
Total	71	74	70	215

Mean	10.75			
Median	11			
SD	0.89			

Delphi Survey 3 Raw Data

Item	SME1	SME2	SME3	Total Scores
1	4	4	4	12
2	3	3	4	10
3	3	4	4	11
4	4	3	3	10
5	3	4	4	11
6	3	4	3	10
7	4	4	3	11
8	4	4	4	12
9	4	3	4	11
10	3	4	3	10
11	4	4	3	11
12	3	4	3	10
13	4	3	4	11
14	4	4	3	11
15	3	3	4	10
16	4	4	3	11
17	3	3	4	10
18	4	4	3	11
19	4	4	4	12
20	4	3	4	11
Total	68	73	71	212

Mean	10.60			
Median	11			
SD	0.71			

Delphi Survey 4 Raw Data

Item	SME1	SME2	SME3	Total Scores
1	4	3	4	11
2	3	4	3	10
3	4	4	3	11
4	3	4	3	10
5	4	3	4	11
6	4	4	3	11
7	3	3	4	10
8	3	4	3	10
9	4	3	4	11
10	4	4	3	11
11	3	3	4	10
12	4	4	3	11
13	3	3	4	10
14	4	4	3	11
15	4	4	4	12
Total	54	54	52	160
Mean	10.67			
Median	11			
SD	0.60			

Delphi Survey 5 Raw Data

Item	SME1	SME2	SME3	Total Scores
1	4	4	4	12
2	4	4	4	14
3	4	4	3	11
4	3	4	3	10
5	4	3	4	11
6	4	4	3	11
7	3	4	4	11
8	3	4	3	10
9	4	4	4	12
10	4	4	3	11
11	3	3	4	10
12	4	4	3	11
13	3	3	4	10
14	4	4	3	11
15	3	4	3	10
	54	57	52	163
Mean	10.87			
Median	11			
SD	0.37			

Delphi Survey 6 Raw Data

Item	SME1	SME2	SME3	Total Scores
1	4	4	4	12
2	4	4	4	12
3	4	4	4	12
4	4	4	3	11
5	4	4	4	12
Total	20	20	19	59
Mean	11.8			
Median	11			
SD	0.46			

Delphi Survey 7 Raw Data

Item	SME1	SME2	SME3	Total Scores
1	4	4	4	12
2	4	4	4	12
3	4	4	4	12
4	4	4	4	12
5	4	4	4	12
6	4	4	4	12
7	4	4	4	12
8	4	4	4	12
9	4	4	4	12
10	4	4	4	12
11	4	4	4	12
12	4	4	4	12
Total	48	48	48	144
Mean	12			
Median	12			
SD	0			

Appendix H

Research Question 2 Results: Raw Data

(Delphi Survey 8-Delphi Survey 9)

Delphi Survey 8 Raw Data

Item	SME1	SME2	SME3	Total Scores
1	4	4	4	12
2	4	4	4	12
3	4	4	4	12
4	4	4	4	12
5	4	4	4	12
6	4	4	4	12
7	4	4	4	12
8	4	4	4	12
Mean	12			
Median	12			
SD	0			

Delphi Survey 9 Raw Data

Item	SME1	SME2	SME3	Total Scores
1	3	3	4	10
2	4	4	4	12
3	4	4	4	12
4	4	3	4	11
5	3	4	4	11
6	4	4	4	12
7	4	4	4	12
8	4	4	4	12
9	4	4	4	12
10	4	4	4	12
11	4	4	4	12
Mean	11.64			
Median	11			
SD	0.674			

Appendix I

Research Question 3 Results: Raw Data

ID	Group	a1	b1	a2	b2	a3	b3	a4	b4	a5	b5	a6	b6	a7	b7	a8	b8	avg1	avg2	avg3	avg4	avg5	avg6	avg7	avg8	Total
1	1	4	4	4	3	4	4	4	4	4	4	4	4	4	4	4	4	4.00	3.50	4.00	4.00	4.00	4.00	4.00	4.00	31.00
2	1	4	4	4	4	4	4	3	4	4	4	4	4	4	4	4	3	4.00	4.00	4.00	3.50	4.00	4.00	4.00	3.50	30.00
3	1	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	3	4.00	4.00	4.00	4.00	4.00	4.00	4.00	3.50	31.50
4	1	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	32.00
5	1	4	4	4	4	4	4	4	4	4	4	4	4	4	4	3	4	4.00	4.00	4.00	4.00	4.00	4.00	4.00	3.50	31.50
6	1	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	32.00
7	1	3	4	3	4	4	4	3	3	4	4	3	4	3	4	2	3	4.00	3.50	4.00	3.00	4.00	3.50	3.50	2.50	28.00
8	1	4	4	4	4	4	4	4	4	3	4	4	4	4	3	4	3	4.00	4.00	4.00	4.00	3.50	4.00	3.50	3.50	30.50
9	1	4	4	3	4	4	4	4	4	4	4	3	4	4	4	4	4	4.00	4.00	3.50	4.00	4.00	3.50	4.00	4.00	31.00
10	1	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	32.00
11	1	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	32.00
12	1	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	32.00
13	1	4	4	4	3	4	4	4	4	4	4	4	4	4	4	4	4	4.00	3.50	4.00	4.00	4.00	4.00	4.00	4.00	31.50
14	1	4	3	3	3	4	4	3	4	4	4	4	4	3	3	4	4	3.50	3.00	4.00	3.50	4.00	4.00	3.00	4.00	29.50
15	1	4	3	4	4	4	4	4	4	4	4	4	4	4	4	4	4	3.50	4.00	4.00	4.00	4.00	4.00	4.00	4.00	31.50
16	1	4	4	4	4	4	4	4	4	4	4	4	4	4	4	3	3	4.00	4.00	4.00	4.00	4.00	4.00	4.00	3.00	31.00
17	1	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	32.00
18	1	4	4	4	4	4	4	4	4	4	4	4	4	3	3	4	4	4.00	4.00	4.00	4.00	4.00	4.00	3.00	4.00	31.00
19	1	4	4	4	4	4	4	4	4	4	4	3	3	3	3	3	3	4.00	4.00	4.00	4.00	4.00	3.00	3.00	3.00	29.00
20	1	4	4	4	4	4	4	4	4	4	4	4	4	4	4	3	3	4.00	4.00	4.00	4.00	4.00	4.00	4.00	3.00	31.00
21	2	3	4	3	3	4	4	4	4	4	4	3	4	3	4	3	3	3.50	3.00	4.00	4.00	4.00	3.50	3.50	3.00	29.00
22	2	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	32.00
23	2	3	3	4	3	3	4	2	3	4	4	3	3	2	3	2	1	3.00	3.50	3.50	2.50	4.00	3.00	2.50	1.50	23.50
24	2	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	32.00
25	2	3	4	3	4	4	4	3	4	4	4	4	4	3	4	3	3	3.50	3.50	4.00	3.50	4.00	4.00	3.50	3.00	30.00
26	2	4	3	4	3	4	4	4	3	4	4	3	4	4	3	4	3	3.50	3.50	4.00	3.50	4.00	3.50	3.50	3.50	30.00
27	2	3	4	4	3	4	4	4	4	4	4	4	4	4	3	3	3	3.50	3.50	4.00	4.00	4.00	4.00	3.50	3.00	30.50
28	2	4	4	3	4	4	4	4	3	4	4	4	4	3	4	3	4	4.00	3.50	4.00	3.50	4.00	4.00	3.50	3.50	31.00
29	2	4	3	3	3	4	4	4	4	4	4	4	4	3	4	3	3	3.50	3.00	4.00	4.00	4.00	4.00	3.50	3.00	31.00
30	2	3	4	4	4	4	4	4	4	4	4	4	4	4	3	3	3	3.50	4.00	4.00	4.00	4.00	4.00	3.50	3.00	32.00
31	2	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	32.00
32	2	3	3	3	4	4	4	3	3	4	4	4	4	3	4	3	3	3.00	3.50	4.00	3.00	4.00	4.00	3.50	3.00	29.50
33	2	3	4	4	4	4	4	4	4	4	4	4	4	3	4	4	3	3.50	4.00	4.00	4.00	4.00	4.00	3.50	3.50	32.00
34	2	4	4	4	4	4	4	4	4	4	4	4	4	3	3	3	3	4.00	4.00	4.00	4.00	4.00	4.00	3.00	3.00	31.50
35	2	4	3	3	3	4	4	3	3	4	4	4	4	4	3	3	2	3.50	3.00	4.00	3.00	4.00	4.00	3.50	2.50	29.50
36	2	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	32.00
37	2	4	3	4	4	4	4	4	4	4	4	4	4	4	3	4	4	3.50	4.00	4.00	4.00	4.00	4.00	3.50	4.00	32.00
38	2	4	4	4	3	4	4	4	4	4	4	4	4	3	4	4	3	4.00	3.50	4.00	4.00	4.00	4.00	3.50	3.50	31.50
39	2	4	3	4	4	4	4	4	4	4	4	4	4	4	4	4	4	3.50	4.00	4.00	4.00	4.00	4.00	4.00	4.00	31.50
40	2	3	4	3	4	4	4	4	4	4	4	4	4	4	3	3	3	3.50	3.50	4.00	4.00	4.00	4.00	3.50	3.00	31.00

- ID indicates the 40 students' proposals.
- Group 1 indicates members of Experimental Group and Group 2 indicates members of Control group.
- a1 through a8 indicates scores of the first grader on items 1 through 8; b1 through b8 indicates scores of the second grader on items 1 through 8.
- The graders average scores are displayed in columns avg1 through avg8
- Total indicates the combined score of both graders on the 8 items for each student