Developing Project Based Learning, Integrated Courses from Two Different Colleges at an Institution of Higher Education: An Overview of the Processes, Challenges, and Lessons Learned

Marilyn Rice
Curriclum and Instruction Department
Sam Houston State University

Li-Jen Shannon
Computer Science Department
Sam Houston State University

Abstract

All too often, courses in higher education tend to teach isolated bits of facts with little effort to assist in learner assimilation of those facts so as to grow knowledge of the world into a more dynamic understanding. To address the need for a capstone research project for students in their master's program and in an effort to create online courses which offer a more meaningful learning environment with integrated curriculum, two professors chose to accomplish this by combining their courses over a two-semester period of time. An additional challenge existed since these two courses were in two separate departments (Computer Science and Curriculum & Instruction), and in two different colleges (College of Sciences and College of Education) on a university campus. This article explains why they chose project based learning as the foundation for merging these courses. Further, it describes the process, the assignments, the challenges, and the lessons learned.

Keywords: Integrated Curriculum, Distance Education, Project Based Learning, Instructional Technology, Capstone Research Project.

1. INTRODUCTION

In the world of instructional technology, course content does not stay the same over time. With the array of tools and resources available, and changing, over time, it is necessary to adjust/adapt courses in order to remain pertinent. That is certainly the case with the faculty of the Master's in Instructional Technology Program (MIST) at Sam Houston State University. Although we modify courses each semester within our existing standards to address the changing technologies, when the industry standards themselves change, it provides an opportunity to review an existing curriculum and determine what changes must be made in order to address these new standards.

A recent change in the International Society for Technology in Education organization's alignment of standards from Technology Facilitators to Technology Coaches prompted a juncture in time to review the curriculum in the Masters of Instructional Technology Program. With the program being a unique combination of curriculum between the Department of Curriculum and Instruction in the College of Education and the Department of Computer Science in the College of Sciences, our collaboration seems to be more intentional, intellectual, and philosophically engaging than curriculum discussions involved within only one

department. Whether the result of this faculty sharing the same ideals about our area of focus or whether it is the fact that we approach it with the knowledge that we are two departments in different colleges so we sub-consciously come to the meeting recognizing our differences and expecting discussion and compromise, the situation seems to benefit the students of the program by resulting in a better curriculum and better learning opportunities for them.

It was determined that curriculum in the first four semesters of the program would present foundational assignments that taught teaching philosophies, theories, and smaller "practice" applications of skills learned. The last two semesters, which are the fourth and fifth semesters, would then allow the opportunity for students to demonstrate their mastery of virtually all of the standards the entire program aimed to address. With that decided, the two faculty members teaching those last four courses began the journey to determine how to turn that plan into a curriculum.

Since we both had been putting at least some elements of Project Based Learning (PBL) in our courses in the past and were striving to do more of it, we began to plan that direction.

2. WHY PROJECT BASED LEARNING?

As the early authors in instructional technology attempted to tell us what makes the foundation for good instruction when using technology, we begin to see a trend in similarities. Although the same wording is not used, the meanings of what they list as the most important elements to include in instructional technology are very much the same, as seen below:

Since project based learning falls along the learning theory continuum more toward the end of the constructivism scale, those authors who wrote about technology and constructivism helped to lay the foundation. As an example, Bednar, Cunningham, Duffy, and Perry (1991), early on in the emergence of instructional technology, explained that "instructional design emerges from the deliberate application of some particular theory of learning (p. 102)." Written from their view of constructivism, they went on to describe a constructivist's assumptions that are consistent with beliefs in this learning theory:

1.Situated Cognition in real-world contexts
2.Teaching through cognitive apprenticeship

3.Construction of multiple perspectives
Moursund (2003) advocates for project based learning, saying that it has a high level of "authenticity" (p. xi). He points out that an information technology-assisted PBL lesson is an opportunity for students to:

1.Learn in an authentic, challenging, multidisciplinary environment
2.Learn how to design, carry out, and evaluate a project that required sustained effort over a significant period of time
3.Learn about the topics on which the project focuses
4.Gain more information technology knowledge
5.Learn to work with minimal external guidance, both individually and in groups
6.Gain in self-reliance and personal accountability

He also points out that information technology helps "create a teaching and learning environment in which students and teachers are both learners and facilitators of learning – that is, they function as a community of scholars (p. xi)." Jonassen et al (2008) describes the characteristics of Meaningful learning:

1.Active (Manipulative/Observant) Learning
2.Constructive (Articulative/Reflective)
3.Intentional (Goal-Directed/Regulatory)
4.Authentic (Complex/Contextual)
5.Cooperative (Collaborative/Conversational)

Jonassen says that learning results from thinking and points out the different ways of thinking that are fostered by the use of technology:

1.Causal
2.Analogical
3.Expressive
4.Experiential
5.Problem Solving

Why would students be interested in learning in a project based format? According to Daniel Pink, in our current "traditional" educational system of today, we are "bribing students into compliance instead of challenging them into engagement (p. 185)." It is no coincidence that the lists of important elements from each of the instructional technology authors above can all be compared and subsumed under and within Daniel Pink's list of elements that describe a Type I (intrinsically motivated) personality:

1.Autonomy
2.Mastery

3.Purpose

We have been told for years by various theorists, educators, and authors from various walks of life that we need more engaging, autonomous, authentic, cooperative learning processes in our formal educational institutions. Fischer (2015) echoed that process is important in student-driven group projects where the primary goal may be cooperative learning. We've just chosen to not listen and put it all together.   (Or, perhaps, like many of our graduate students, they don't read, so nobody is making the connections!)

Listening to what Bednar, et al., Moursund, Jonassen, and Pink say above, along with considering Bednar, et al. indicated that instructional design developers must first be aware of their personal beliefs about learning and "select concepts and strategies from those theories that are consistent with those beliefs (p. 102)", we two instructors looked within ourselves to ensure that we understood and aligned our instructional development with our beliefs about what is the best theory of learning for our content. We wished for our students to not simply learn isolated materials and skills, but to actively apply and work with that knowledge and skills in real-world situations. It was also a goal of ours to help our students become intrinsically-motivated, independent researchers and thinkers. As technology has been viewed to provide a more authentic context than traditional classrooms could afford (Cifuentes & Ozel, 2009), we wanted to prepare our students to be not only the ones who simply lead technology integration into instruction, but the change-agents who also model how to do this in an authentic, multi-disciplinary environment where learners have opportunities to practice critical thinking, problem solving, and effective communication skills. At the same time, influenced by Boss and Krauss (2014) who said that "deeper learning" gets at the increased academic rigor to gain traction to describe the multifaceted outcomes of project-based learning, we acknowledged that our philosophies of how students learn best were the foundational elements of project based learning. In addition, our experiences with PBL in this program and other courses had led us to recognize the positive impact PBL has on the delivery of our instruction. Thus, this was our main motivation to accept the challenge to integrate our courses into this process.

Although we felt that the information provided by these authors in instructional technology was justification enough to design our instruction in the project based learning format, there were also other important reasons to consider; and these helped support our philosophy of engaged learning as the center of instruction:

1.The practical framework of project-based learning has been continually growing in K-12 schools across America over the past few decades, and making a significant impact (Fischer, 2015). Eventually, those students will expect to learn that way in the higher education venue.

2.Project based learning demonstrates how to meaningfully integrate technology into the classrooms. As the carefully designed project is carried out by the learners, the seamless use of technology at the appropriate junctures best demonstrate what we mean by "meaningful implementation of technology".

3.Boss (2015) emphasized that action projects actually put students' ideas to work. Seeing their ideas in action can provide the confidence and encouragement for students to become more active citizens. What better way to facilitate the implementation of action projects among our K-16 schools and enterprises' practices than preparing our technology coaches to model how it's done? This accomplishes what Schwering (2015) tells us is expected by employers: graduates can actually integrate and apply what they have learned into real world applications.

3. THE PROCESS

All authors referenced above talked about what needed to be included in the instructional process when designing the integration of technology into the curriculum. Using the elements of PBL by Buck Institute for Education (2011), we developed the instruction so that the following elements were embedded within the design of the project: Driving Question, Need to Knows, Inquiry, Voice and Choice, Reflection & Revision, and Authentic Public Audience, all based on the foundation of the Significant Content and designed to give the students an opportunity to practice and learn Critical Thinking, Collaboration, and Communication.
To begin, we had to focus on ensuring that our students showed evidence that they had mastered the program standards (PBL

Significant Content). That began the process that resulted in a chart that identified the:

1. Objectives (Overall)
2. Objectives (As addressed by each course)
3. Resource and Strategy Suggestions (For each course)

Since some objectives were taught in both courses while some objectives were taught only in one course, we felt it necessary to design a visual that could easily describe for our students where those objectives were being taught and where they could expect to see these objectives as criteria in their assignment rubrics. An example of the chart can be found in the Appendix below.

After designing this chart to include all of the objectives and where those objectives would be taught, we began to brainstorm how we could design a driving question that would be the guiding query for our students over the next two semesters. A critical opening to establish a learning opportunity, the driving question had to be broad enough to cover all objectives, but narrow enough so that the students could continue to focus on it as they went through the two semesters. The decision was made to present the driving question (PBL Driving Question) as follow:

"How do you, as a Technology Coach, demonstrate mastery of the knowledge, skills, and dispositions required in order to achieve the role of a transformational change agent in the organization?"

This began the students' journey. They were guided, first, by the instructors' carefully designed chart communicating the objectives, with the "Resources/Strategies" column revealing possible methods to use to master the objectives. In addition, each professor developed her own written assignment, as necessary, describing in full detail how the mastery of objectives were assessed in that course. Where appropriate, the professors shared the same Rubric. When the expectations differed too much, two different Rubrics were developed to better clarify for the students the expectations for each course. Nevertheless, the "Project" remained common for both courses in tandem so that, as the students moved through the semesters, their end results would address the expectations of both courses.

4. SEMESTER 4 IN THE PROGRAM

In an attempt to bring an overwhelming amount of knowledge to learn into a format of "assignments", we found that this chart easily fit into two areas. The first part of it held objectives that led students to discover the instructional training needs of their organizations, while the second part focused more on designing a training package for their organizations. Thus, we referred to the two big areas of the semester as the "Needs Analysis" and the "Training Package". There, of course, were work expectations within each of these, but breaking the semester down between these two areas helped the students as they worked their way through this project. In each element listed below, the students addressed the criteria from both the (1) Infrastructure/Hardware and the (2) Instructional/Curriculum perspectives.

Needs Analysis (PBL Inquiry):
a. Research conducted to identify the organization's Technology Goals
b. Conducting the Technology Analysis
c. Analyzing the Current Status of the Organization and its learners and its progress toward the achievement of its technology goals

Once the Needs Analysis was completed, the students then Developed and Designed Objectives (PBL Significant Content) for the Organization's Training. These would guide them as they developed the various parts of the Training Package.

Training Package (PBL Authentic Public Audience):
a. Development of your Assessment Instruments
b. Researching and developing the Funding and Management strategy for the Training
c. Developing the Training Package itself
d. Evaluating with Training Package
e. Revising the Training Package and finalizing the finished product

5. SEMESTER 5 IN THE PROGRAM

Following the design of the Training Package, the fifth and final semester of the program would have the students continue on in their project, gathering information they would need to develop their training into an online venue. The first part of the semester was spent to research, followed by the design of their training online, with the final task being a written case study over their process with the expectation that they would submit this as an article to a

journal or as a paper to be presented at conference.

Research (PBL Inquiry):
Distance Learning Course (Instructional/Curriculum). Presented in the form of a literature review, this research focuses more on the learners, their abilities, assessment/evaluation, the tech tools (apps, videos, etc.) to use to address the learner's needs, ethics involved in online learning venues, and instructional online learning theories.

Management Application Analysis Course (Infrastructure/Software). This is a study of the hardware/infrastructure used to be able to present the learning materials. Beginning with a Literature Review to discover what criteria would be best to review the Learning Management Systems (LMS's), the literature review is directed to the three areas of Course Building Functions, LMS Server Functions, and LMS Training and Service.

Article Submission (PBL Authentic Public Audience). Over the two semesters, students researched, interviewed, analyzed, planned, developed, reviewed, revised, and implemented their training packages. Now, they are given the opportunity to "tell your story". Conducting successful training with technology and the implementation of technology continues to be an enigma, in some cases. Some is deemed successful, some is not. Some instructors take what they've learned from their training and implement it for their learners. Some simply go through the training as it's presented, but leave with nothing they want or intend to pass along to their learners. Perhaps this conundrum is exacerbated by the mere difference in philosophies of what technology is, does, and its intended purpose; along with what goals, if any, it helps us achieve.

During the last two semesters, via the intentional design of the curriculum in the MIST program, students were guided through the steps necessary to plan, prepare, and conduct a training session that is meaningful for their chosen audience. The assignment of the Publishable Paper provides the vehicle for them to share with others the process of developing a training package worthy of success. It also serves as their reflection over the process and allows them to consider how to improve upon it next time. With this paper, they have the opportunity to help others understand the process of achieving more successful

implementation of technologies into their instruction.

The article brings together the various elements as broken down above:

a. Research conducted to identify the organization's Technology Goals
b. Conducting the Technology Analysis
c. Analyzing the Current Status of the Organization and its learners and its progress toward the achievement of its technology goals
d. Developing and Designing Objectives for the Organization's Training
e. Development of your Assessment Instruments
f. Researching and developing the Funding and Management strategy for the Training
g. Developing the Training Package itself
h. Evaluating with Training Package
i. Revising the Training Package and finalizing the finished product
j. Conducting the Literature Review and LMS Review and how that led you to decide on what you would do for your online training package
k. How did you implement your training? What problems occurred? Did you achieve your training goals and objectives?
l. How would you change your online training to make it better next time?
m. After writing about all of the above, you will decide how you will share your experiences with the rest of the world (PBL: Voice and Choice). This should be in the form of a journal article, case study, conference proceedings, etc.

The listed requirements above align directly with what students have done throughout the past two semesters. Therefore, they've lived it, reflected on it, documented the process at various junctures; and now had the opportunity of bringing all of this process together in one written paper. Reviewing their writings, reflections, findings, etc., melding them into their own stories, they could share how they developed a successful training package.

6. Findings

Developing an integrated curriculum between two courses in higher education are challenging at best. While it appears that the divide between departments and colleges might make the task impossible, the common bond of the unique program that brings some faculty from the two departments together certainly helps

alleviate the challenges. In addition, the working relationship of having taught in unison over the years helped to create a sort of philosophical foundation that facilitates the process.

We, as our students, never stop learning. This challenge of merging these two courses for these two semesters certainly underscored that fact. Here are some of the lessons we've learned so far in the process:

Communicate,Communicate,Communicate:
Communication between instructors to ensure that we are constantly checking and rechecking each other's expectations for our students while they address objectives of both courses.

Communication between instructors and students (PBL: Communication) to clarify expectations and provide explanations. The consistency with which we answer our students, the way we copy each other in e-mails, and our being open to conversation among the two courses also models collaboration for our students.

Communication among students (PBL: Communication) is critical as they work in teams to support to each other via peer reviews (which prompts revisions) (PBL Reflections & Revisions), academic discussions about current research and what is still necessary to be learned (PBL Need for Know's), and learn to work collaboratively (PBL: Collaboration) on some of the selected assignments.

Communication about the course expectations need to be written, clear instructions. In addition, insert videos, online office hours, and strive for quick e-mail responses to ensure students do not have lingering questions or feel lost in cyberspace.

Design Good Assessments from the Very Beginning:
Design good rubrics that are aligned with the standards/objectives. This process continues to remind students of "why are we doing this" (because there are standards we must address) as well as continue to communicate your expectations for their level of performance in presenting evidence of mastery of the objectives for the courses.

Keep it Simple!
In an online course, don't confuse your students with how the assignments, project, and information is presented visually within your learning management system. You must guide them through the process even though they have many junctures for voice and choice along the way. Project based learning is a very cyclical process; it is not a checklist of things where you check them off and forget them. Everything should have a purpose in the complete project and "count" for something. All should be connected. In a true project based learning course, you have no room or time for extraneous, disconnected assignments.

But, at the same time, there is a "common path" (the center line) that moves students forward. Present online materials that maintain the "common path" that guides their journey. This can be accomplished by presenting to them an order of expectations (assignments) that they will be doing as they continue on their project journey. Most commonly known as a linear presentation, let that be the center line, while your various assignments allow them to "circle back" a few steps as needed as they implement self-assessments and peer reviews, and find it necessary to re-think decisions they find were not the best. This is part of the process of giving them the autonomy to make those changes for a better end product while keeping the center line in focus.

7. Conclusions

Sharing the goal to create a curriculum with better learning opportunities for students, but faced with the challenge of being two separate departments in two separate colleges; faculty in the Master's in Instructional Technology Program at Sam Houston State University chose to seat the collaborative instruction within the framework of project-based learning. Having used at least some of the elements of PBL in our individual courses in prior semesters, we had seen the positive impact the process of PBL had on our students as they found a real purpose to their efforts and how it gave them the opportunity to act more autonomously as they demonstrated mastery of the standards.

Over the course of two semesters, students followed a single path for their learning journey while mastering objectives for both courses. The process began with a chart, serving as a graphic, of the overall objectives of the two semesters and the designation of which objectives belong to each course. Following this, the objectives from each course were aligned with the rubrics in the respective courses. At

the foundation of the two semesters was inquiry, as students developed their authentic products.

Discoveries during this process were seated mostly in the challenges of integrating the two courses into the one journey for the students. The charts, models, and rubrics were the foundation for the plan; but we continued to find that communication between ourselves, with students, and among students was paramount to clearly communicating expectations for the two courses, especially in the online environment. As we moved through the process, we found that the simpler the written and oral explanations to the students in these online courses; the better was the quality of their products.

8. REFERENCES

Bednar, A.K., Cunningham, D., Duffy, T.M., Perry, J.D. (1991). Theory into practice: How do we link? In G.J. Anglin (Ed.), Instructional technology: Past, present, and future (pp. 100-112). Englewood, CO: Libraries Unlimited, Inc.

Boss, S. (2015). *Real-World projects*. Alexandria, VA: ASCD Arias.

Boss, S., & Krauss, J. (2014). *Reinventing Project-based learning*: *your field guide to real-world*. International Society for Technology in Education.

Buck Institute for Education. (2011). *PBL 101 workbook*. Novato, California: Buck Institute for Education.

Cifuentes, L., & Ozel, S. (2009). *Using ttechnologyyy to support STEM Project-Based Learning.* in *Capraro*, R. M., Slough, S. W., (Eds.). *Project-Based learning: An integrated science, technology, engineering, and mathematics (STEM) approach.* Rotterdam, the Netherlands: Sense.

Fischer, C., (2015). Project-Based Learning. *Research Starters: Education*. P.8.

Jonassen, D., Howland, J., Marra, R., Crosmond, D. (2008). *Meaningful learning with technology.* Upper Saddle River, New Jersey: Pearson.

Moursand, D. (2003). *Project based learning: Using information technology*. Washington, D.C.: International Society for Technology in Education.

Pink, D.H. (2009). *Drive*. New York, NY: Penguin Group.

Schwering, R. E. (2015). Optimizing learning in project-based capstone courses. *Academy of Educational Leadership Journal.* 19(1), p90-104.

Appendix

Learning Objectives	CIED Distance Learning	CIED 5369 Resources/ Strategies	CSTE Management Application Analysis	CSTE 5338 Resources/ Strategies
o Identify the areas of organization's profile in Technology, Funding, and Management o Identify the related legislated requirements and regulations o Research and Summarize the perceived technological needs from the organization/ management, teachers/trainers, students/learners, parents	o Identify the organization profile in Technology **(Instructional/Curriculum)** o Identify the organization profile in Funding and Management **(Instructional/Curriculum)** o Identify the related legislated requirements and regulations (for **Instructional/Curriculum**) o Research and Summarize the perceived technological needs (for **Instructional/Curriculum**) from the: a. administrators/management, b. teachers/trainers, c. students/learners, d. parents/vendors (or other party who has a stake in the training)	*Vision/ Master Plan of Organization/ Written Policies *Identify Federal and State Technology Standards, Industry Standards & Expectations *Interviews/ Surveys	o Identify the organization profile in Technology **(Infrastructure/ Hardware)** o Identify the organization profile in Funding and Management **(Infrastructure/Hardware)** o Identify the related legislated requirements and regulations (for **Infrastructure/Hardware**) o Research and Summarize the perceived technological needs (for **Infrastructure/Hardware**) o from the: a. administrators/management, b. teachers/trainers, c. students/learners, d. parents/vendors (or other party who has a stake in the training)	*Physical layout of technology infrastructures including computer systems and peripherals in laboratories, classrooms, and other instructional arrangements *Existing storage devices, network systems, software implemented *Observing the maintenance support system for installing, troubleshooting, managing, and maintain for LAN, WAN, and other educational systems