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A Full Flip: One Catholic University's Journey with Campus-Wide Flipped Instruction

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A campus-wide flipped curriculum model was initiated at a new, private, Catholic university in a large southwestern suburb. The design and development of the curriculum is presented. A formative evaluation was conducted mid-semester to determine the effectiveness of the initiative. Surveys and interviews were conducted with both faculty and students and classroom observations were conducted. Results from the evaluation indicate that students and faculty like the flipped model and that the students have a high level of engagement with the instructional content. Areas for improvement include organization of course materials and the inclusion of pre-recorded lectures. Further training support for faculty and academic support for first-year students is also recommended.

Keywords: Flipped model, curriculum evaluation, problem-based learning, instructional design

Introduction

Research indicates that learners need to be engaged and invested in their own learning experience; in other words, to be active in their learning process (Hesson & Shad, 2007; O'Neill & McMahon, 2005; Weimer, 2003). Learners must also be able to apply that knowledge in a meaningful way that allows them to explore the topics in-depth. In recent years, although the flipped classroom—one in which learners listen to lectures at home and complete activities, labs or discussions during class time—has become more prevalent in secondary education, certain disciplines in institutions of higher education are slower to transform their classroom model away from the "sage on a stage" to a more student-centered model of learning like flipped instruction (Dolmans, De Grave, Wolfhagen & Van der Vleuten, 2005; Yew, Chng, & Schmidt, 2011). The HEAT initiative (Healthcare, Education, Aerospace/Aviation, Tourism) invited four institutions of higher learning to open campuses in a large southwestern suburb, each providing a unique approach to learning and a diverse program offering, in an effort to affect educational change and

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impact student learning on a larger scale than just the classroom. A private, nonprofit Catholic university saw an opportunity to bring core Benedictine values, such as living life in balance, to the citizens of the city and determined that with the opening of a new branch campus, there was an opportunity to create something innovative and unique within the framework of the Roman Catholic mission.

As a Catholic university in the Benedictine tradition, this university was uniquely suited for the innovative challenge they set for themselves. One of the primary Benedictine values held by this university is a "commitment to academic excellence" (Center for Mission and Identity, n.d.). The opportunity to be the first institution of higher education in the city, to provide faith-based education to its citizens, and to create a curriculum model that could propel students to academic excellence was not one to be taken lightly. Additional Benedictine values of "an appreciation for living and working in the community" and "a concern for the development of each person" drove the design of the curriculum model that would support both the values and provide innovation in Catholic Higher Education (Center for Mission and Identity, n.d.). This university answered the call to provide a model of higher learning that included flipped classrooms and problem-based learning methods as part of a city-wide revitalization project to increase educational opportunities in the area for local residents and out-of-state students.

In addition to implementing the flipped model, the new faculty hired for this branch campus committed to integrating problem-based learning techniques and strategies to create an engaging learning environment that gives learners a larger role in their own learning experience. This campus-wide adoption of the flipped model is a collaborative experiment in student-centered learning that focuses both on academic excellence and on the concern for the development of each individual student. The addition of the problem-based learning method allowed for the integration of Catholic Social Teachings as students could be led to explore "the sanctity of human life; call to family, community, and participation; rights and responsibilities; option for the poor and vulnerable; the dignity of work and rights of workers; solidarity; and care for God's creation" in all topics and disciplines through the exploration of real-world problems (Hise & Koepline, 2010).

Because the campus-wide flipped initiative is the only one in existence, according to the current literature, and because the primary focus of this university was the learning outcomes, a formative evaluation was planned for the end of the first semester as part of an ongoing improvement process

for the curriculum development model in an effort to provide "a continuing reflection in light of the Catholic faith upon the growing treasury of human knowledge, to which it seeks to contribute by its own research" (Center for Mission and Identity, n.d.). Results of the study were used to implement improvements in the curriculum design and faculty training process.

Review of the Literature

Flipped Classroom

To date, there is very little empirical evidence regarding the effectiveness of the flipped classroom, also often referred to as the inverted classroom, on improving student learning outcomes. However, the informal research suggests that the flipped classroom model is moderately effective at engaging and motivating learners (Goodwin & Miller, 2013; Herreid & Schiller, 2013; Sams & Bergmann, 2013; Wiginton, 2013). A flipped classroom model takes a traditional classroom lecture model and stands it on its head. In this model that is a type of blended or hybrid model of learning, learners are sent home to watch or listen to prerecorded lectures generally posted online and then the come to class to participate in active learning strategies such as discussions, role-plays, projects, or reflection. Studies have shown that in blended classes using online technologies to supplement in class instruction, the technologies allow students to learn at their own pace which seems to enhance their progress (López-Pérez, Pérez-López, Rodríguez-Ariza, & Argente-Linares, 2013). Some empirical studies have indicated that the flipped model of instruction leads to increased class attendance, a higher level of motivation, and better preparedness for in-class activities than traditional models (Gehringer & Peddycord, 2013; Quint, 2015; Tawfik & Lilly, 2015). However, other studies have indicated that the flipped classroom model does not lead to increased academic achievement and that it actually leads to a decrease in student class attendance (DeSantis, Van Curen, Putsch, & Metzger, 2015; Noor, 2013; Smith, 2015;)

Research studies following the training of faculty on flipped instruction methods and subsequently the implementation of the flipped model in the classroom have shown a higher level of excitement on the part of the instructor in designing course material and a higher degree of personalized learning due to the increase in opportunities for one-to-one interaction with students (Brown, 2012). The flipped model of instruction not only potentially improves student engagement in classroom activities, but also improved their

self-efficacy in regards to becoming more independent learners (Enfield, 2013; Quint, 2015; Tawfik & Lilly, 2015; Wiginton, 2013).

Several areas of concern have been identified with the flipped classroom model. Learners may be resistant to the model because it requires them to be exposed to new content at home rather than in the classroom, which many learners may find uncomfortable (DeSantis et al., 2015; Herreid & Schiller, 2013; Smith, 2015). Careful preparation of effective instructional materials, such as video lectures, is required and may be beyond the skill or interest of some instructors (Herreid & Schiller, 2013). Another significant concern is the availability of technology to the learners. Not all learners have access to computers or technology at home that would allow them to listen to or watch lectures (Nawi et al., 2015; Neilson, 2012). The flipped model is suggested as less effective than other models in developmental math courses due to the fact that students tended not to come to class prepared to complete activities (Al-Zahrani, 2015; Janusa, 2014; Nawi et al., 2015). True implementation of the flipped classroom model must include provisions for student technology use, either through scheduled lab time or a one-to-one computing initiative that provides learners with the technology needed to complete the homework.

Problem-Based Learning (PBL)

The in-class component of this university's flipped classroom is structured through problem-based learning techniques, based on the problem-based learning definition as put forth by Amador, Miles, and Peters (2006), "PBL involves small groups of students working in permanent groups to learn the course content within the framework of a realistic problem" (p. 10). The cycle of PBL problem solving includes presenting students with a problem, allowing them to define the aspects of the problem that are unknown, encouraging students to rank the learning priorities within the problem structure and then applying or integrating new or existing knowledge within the context of the problem (Amador et al., 2006). This cycle is then repeated until a solution to the problem has been determined.

Problem-based learning was determined to be an ideal pedagogical method that would encourage the pursuit of Benedictine values through exploration of the curriculum. With well-designed problems, students could develop their appreciation for living and working in the community, or increase their commitment to responsible stewardship of the earth. Projects under this model could center around service to the community and involvement in lo-

cal issues and events that would increase their awareness of what it means to be concerned for the common good (Center for Mission and Identity, n.d.).

Problem-based learning has been shown to positively affect student motivation and increase team-building even across multiple disciplines (Brodie, 2009; Ersoy & Başer, 2010; Jones, Epler, Mokri, Bryant, & Paretti, 2013). It has the potential to improve students' perceptions of teamwork, collaboration, and professional identity in addition to improving their perceptions of autonomy (Cusack et al., 2012). It has also been suggested that through the problem-solving process, problem-based learning allows students to increase learning transfer or their abilities to apply knowledge learned in the classroom to real-life situations (Hung, 2013), making it an ideal format for students to practice and explore what they will be doing outside the classroom in the discipline.

There are several challenges to problem-based learning. Teachers must learn to balance time between in-depth exploration of content and achieving learning objectives. They must also train themselves to shy away from direct, explicit instruction and embrace their role as content guide. Both formative assessment, which allows an instructor to perform knowledge checks and adjust instruction based on the results, and summative assessments, those assessments that gauge mastery or attainment of a learning objective, should be utilized (Grant, 2011) to insure that students are not lost, frustrated or drawing erroneous conclusions.

Student-Centered Learning

One of the key elements of the flipped instruction model is the active learning that occurs in the classroom in place of traditional classroom lecture. Putting the student at the focus of the learning experience is not a new concept, nor is the idea of making the learner more responsible for their own learning experience (McCabe & O'Connor, 2014). Student-centered learning is a combination of the student having a choice in their own learning process while completing more work in the class than the instructor, shifting the power relationship from teacher to student (O'Neill & McMahon; 2005). The benefits to moving to a more student-centered classroom include encouraging students to take ownership of their learning experience and becoming more active and engaged in class activities, group work and other assignments (McCabe & O'Connor, 2014).

Student-centered learning also provides an opportunity for a Catholic university to focus on Catholic Social Teachings situated in the context of

each discipline. By focusing on the authentic self, then encouraging learners to increase their awareness of others through service and commitment, not only is an institution focusing on academic excellence, but spiritual excellence as well. "Just as young adults are capable of a probing self-reflection, so are they capable of a critical engagement with their world. Community service, service-learning courses, and cross-cultural immersion experiences are indispensable opportunities where self and world enter into new relationships" (Bergman, 2011).

The problem with student-centered learning is not only the challenge of shifting away from teacher-centered instruction, but also in motivating the learners to be engaged in their own learning process (Hesson & Shad, 2007). Learners are only now being trained in secondary schools to see their own responsibility in their learning process. As more and more secondary schools transition to more active learning models, such as the flipped classroom, learners are becoming more accustomed to investing in their own learning. However, for those who are new to the active learning process, student-centered learning may seem uncomfortable or confusing as they struggle for direction. Because of this need for guidance, Weimer (2003) describes the instructor's role as a more of a facilitator or coach who can "relinquish control only to reassume it at a point when learners understand that they need help" (p. 51). Student-centered learning can be difficult to implement because it requires an understanding from learners, faculty, and administration of their overall role in the process (O'Neill & McMahon, 2005).

Background

Curriculum Model

The goal of this university was to provide a flipped model of curriculum that used real-world problem solving to explore content and included interactive technology that was accessible on a continual basis through mobile applications. The purpose of this movement was to encourage critical thinking and problem-solving skills while developing real-world skills such as collaboration and technology usage. The vision of the university was to provide an environment where students in any discipline would receive an education steeped in Benedictine values, Catholic Social Teachings and faith. Through service to the community, examination of real-world problems, reflections and self-examination, students would hopefully become stewards of both the community and the Catholic faith.

The curriculum design team at this university identified three main categories of requirements to make the flipped model successful. The first category that the team felt was key to the success of the model was the course design. Measurable learning outcomes were identified for each course, using Bloom's Revised Taxonomy (Anderson & Krathwohl, 2001). Assessments were created and aligned to the learning outcomes, which provided scaffolding for content exploration that gradually increased in cognitive complexity. Problem-based learning strategies were then integrated to provide both context for learning and real-world applications of the content. Finally, collaboration between students was seen as an essential part of this flipped model, therefore group activities and assessments, were built into the curriculum. Students worked together to discuss topics, create multimedia presentations, build websites, write blogs and research problem solutions. Under the second part of this model, technology, a rigorous use of lecture capture technologies, a substantial learning management system (LMS), a one-to-one computing program or a bring-your-own-device program, and use of Web 2.0 technology integration into the assignments, are all elements identified as essential to flipping the curriculum. In addition, the third required element of the model, students, were expected to come to class under the flipped model as digital natives who should be comfortable with the use of basic technology tools, but not experts in applying the use of the tools beyond personal use. 24-hour access to the content via a computer or mobile device was also a requirement of the course design. An instructional designer and an information technologies specialist were on staff to support students who were not digital natives or who struggled with basic use of the technology. Regardless of the digital skill level of the student, no one was precluded from enrolling in a course. The problem-based learning structure required that students use critical thinking skills in addition to available resources, such as the technology support staff, to complete assignments and participate in class.

Curriculum Development

The opening semester of this branch campus included courses for seven majors: Fine Arts, Criminal Justice, Communication Arts, Psychology, Theology, Business and Nutrition. Courses from each program of study were revised to follow the flipped-instruction, problem-based learning model. Because the initial group of enrolled students included both freshmen and

Transfer students, a mixture of lower and upper level courses was included on the course plan in addition to general education courses such as Writing 101. See Table 1 for a list of the courses revised for the first two semesters.

Table 1

Courses Revised for First and Second Semesters by Major

Major	Course Title
Fine Arts	FNAR 111 Drawing FNAR 203 Ancient and Medieval Art FNAR 240 Printmaking FNAR 250 Oil Painting FNAR 294 Computer Art
Criminal Justice	CJUS 233 Police Systems CJUS 260 Introduction to Criminal Justice CJUS 326 Introduction to Criminal Investigation PLSC 102 American Government
Communication Arts	COMM 150 Introduction to Media Studies and Mass Communications COMM 208 Layout and Design for Publication COMM 209 Newswriting and Reporting COMM 253 Public Relations Writing SPCH 110 Basic Speech
Psychology	PSYC 100 Survey of Psychology PSYC 150 Introduction to Statistics PSYC 200 Childhood and Adolescence PSYC 204 Survey of Exceptional Children PSYC 210 Social Psychology
Theology	THEO 101 Theology of Love THEO 102 Theology of Justice THEO 206 Christian Ethics
Business	ACCT 111 Accounting I ACCT 112 Accounting II MGMT 320 Organizational Behavior MKTG 300 Marketing MATH 115 Business Calculus

Table 1 (cont.)

Major	Course Title
Nutrition	NUTR 241 Nutrition through the Life Cycle NUTR 244 Food Science NUTR 246 Experimental Foods NUTR 271 Nutrition and Health Education NUTR 280 Community Health and Nutrition NUTR 298 Cultural Foods
General Education Courses	BENB 098 First Semester Freshman Seminar BIOL 197 Principles of Organismal Biology CMSC 180 Introduction to Computing HUM 210 Cultural Heritage Seminar MATH 110 College Algebra MATH 111 College Trigonometry SOCL 100 Principles of Sociology SPAN 101 Elementary Spanish I SPAN 102 Elementary Spanish II SPAN 201 Intermediate Spanish I WRIT 101 Writing Colloquium WRIT 102 Research Writing WRIT 104 Person in Community

An instructional designer was hired four months prior to the start of the opening semester to assist in developing the curriculum model and in the training of faculty. The role of the instructional designer was to create training materials for both faculty and learners on the flipped classroom, the problem-based learning model, and the use of both the LMS and the mobile devices. In addition, the instructional designer created several example courses using the flipped model in an effort to provide faculty with a visual model to work from. An effort was made to standardize the course syllabus and course shell within the LMS. A syllabus template, calendar of course activities template and an assignment guide template were developed. A course shell template was developed within the LMS.

All templates and training materials were placed into a training course shell within the LMS. New faculty were enrolled in the training course and a week-long series of in-service workshops was held to allow the instructional designer time to train the faculty and provide them time for hands-on guided course creation.

Syllabi from prior semesters were obtained from the main campus of this university. These syllabi were not created for problem-based learning classrooms and required modification of the learning objectives in order to create more measurable and meaningful outcomes. Table 2 illustrates the revised learning outcomes from CMSC 180, Introduction to Information Systems and Computer Science.

Table 2

Examples of Learning Outcomes Revision from CMSC 180

Original Learning Objectives	Revised Learning Objectives
1. Gaining factual knowledge (terminology, classification, methods, trends)	1. Recognize the main components of information systems and computer systems.
2. Learning fundamental principles, generalizations, or theories	2. Explain computer connectivity, the wireless revolution, the Internet, and cloud computing.
3. Learning to apply course material (to improve thinking, problem solving, and decisions)	3. Describe a system unit.
4. Developing specific skills, competencies, and points of view needed by professionals in the field most closely related to this course	4. Illustrate the most significant concerns for effective implementation of computer technology.
5. Acquiring an interest in learning more by asking questions and seeking answers	5. Differentiate between input and output.
	6. Distinguish between system software and application software.
	7. Analyze existing information systems and evaluate the feasibility of alternative solutions.
	8. Propose a systems solution to a start-up company based on their individual needs.

Note. Revised learning objectives were based on Bloom's Revised Taxonomy (Anderson & Krathwohl, 2001)

The learning outcomes were revised using keywords from Bloom's Revised Taxonomy (Anderson & Krathwohl, 2001). The outcomes were then placed in ascending order of alignment with the cognitive domains, starting with

Understanding and moving up to *Evaluating*, although many courses may have started or ended at other points of the cognitive domains (see Table 4). As part of the in-class problem-based learning method, overarching contextual problems were created for each of the example courses. These problems would provide context for students to move through the course content in addition to establishing a final goal for the course. Examples of the problems for two revised courses can be seen in Table 3. Assessments were then developed for the example courses that aligned with the learning outcomes. Because the assessments were aligned to the learning objectives that were ordered according to Bloom's Revised Taxonomy, the assessments themselves also were scaffolded in cognitive complexity. Each assessment was designed to be a portion of the final problem solution, allowing students to make progress on the final assessment and learning objective early on in the course.

Table 3

Examples of Overarching Contextual Course Problems

Course Name	PBL problem for semester-long exploration
CMSC 180: Introduction to Information Systems and Computer Science	Four friends have decided to start a company called Muggle to market and sell their product (called Woozles) online. They have brought your team in as IT consultants. From the ground up, you will help Muggle decide what types of computers and other technology they need, what their web requirements are, and what kind of support they will need as they grow.
WRIT 101: Person in Community: Writing Colloquium	Our community is very diverse, with a rich history. As part of an effort to stimulate the economy, a state senator would like to propose job solutions to help put people back to work. To do this, information is needed on the local community – Who are they? What are their ethnic, religious, and socio-economic backgrounds? What are the most pressing economic issues facing this population? What types of jobs would be the most beneficial for this community? The senator has asked you and your team to put together an analysis of our community, defining the community, explaining relevant information, and presenting an argument for the most pressing economic needs of the constituents.

In the CMSC 180 example illustrated in Table 4, the final course assessment is a proposal to the fake "company" of the recommended computer, software and systems set up that the student can provide. This final problem solution aligns not only with the final learning objective, "propose a systems solution to a start-up company based on their individual needs," but it requires students to integrate all previous assessments and skills into the final project. Unlike the original iteration of this particular course, the revised final assessment under this model has a context that provides relevance for the task, requires critical thinking skills, and asks students to solve a problem. In this course, the flipped model allows students time in class to work with the instructor as they complete assessments. In this way, the instructor can guide the students to the correct problem solution, namely, an appropriate system set up for the fake company. These assessments and their corresponding learning outcomes and cognitive domains can be seen in Table 4.

The seven full-time faculty hired for this project were chosen for both their technology skills and their interest in innovative education techniques. The faculty arrived two months prior to courses starting for training and planning of flipped classes and problem-based methods. They attended a two-day problem-based learning workshop by the authors of The Practice of Problem-Based Learning: A Guide to Implementing PBL in the College Classroom (Amador, et al., 2006). In a series of "think tank" workshops, the faculty collaboratively developed the problems or issues that contextualized the content for each course. In addition, faculty integrated both Web 2.0 and mobile technology into class activities and revised the learning objectives to all courses in alignment with Bloom's Revised Taxonomy (Anderson & Krathwohl, 2001).

The development team planned for all incoming full-time students to be issued iPads the first day of class. The iPad initiative was an effort to address the problem of students not having access to the flipped content outside of class (Neilson, 2012). Full-time faculty members were also issued iPads in order to encourage familiarity with the device students were using and to increase technology integration strategies in the classroom.

Table 4

Examples of aligned assessments and their corresponding learning objectives

Course	Assessment	Learning Outcome	Cognitive Domain
CMSC 180: Introduction to Information Systems and Computer Science	Information and Computing system components digital story	1. Recognize the main components of information systems and computer systems	Understanding
	Computer connectivity, the wireless revolution, the Internet, and cloud computing blog assignment	2. Explain computer connectivity, the wireless revolution, the Internet, and cloud computing.	
	System Unit Sketchup	3. Describe a system unit	
	Effective implementation of computer technology Podcast	4. Illustrate the most significant concerns for effective implementation of computer technology.	Applying
	Input and Output Tweet session	5. Differentiate between input and output.	Analyzing
	System software and application software blog	6. Distinguish between system software and application software	
	Muggle System Proposal	7. Analyze existing information systems and evaluate the feasibility of alternative solutions	
	Muggle System Proposal	8. Propose a systems solution to a start-up company based on their individual needs	Evaluating

Curriculum Evaluation

As part of the effort to continue to improve the curriculum model in an evidence-based manner, a formative evaluation was planned for the first semester after implementation. As was previously indicated, there is a lack of current research and literature on the flipped instruction model and a full-campus evaluation of a flipped curriculum could add to the corpus of literature in addition to providing necessary information for informing the revision of the university's curriculum model. With questions that were aligned with Russ-Eft and Preskill's (2009) Formative Evaluation questions, a formative curriculum evaluation was completed in order to determine:

- The effectiveness of the adopted blended flipped classroom and PBL model in terms of engaging students in their own learning process.
- The attitude of students and faculty regarding the model.
- Areas for improvement within the model.
- Additional professional development opportunities for faculty members in terms of implementing best practices within the model.

Participants

The entire student body (N = 79) at this university for the opening semester was largely made up of 59 (75%) freshman students. The remaining 20 (25%) students were transfer students who were juniors and seniors. Of this group, 29 (37%) agreed to participate in the student survey via a link to an anonymous online survey was sent out to all students' university email accounts. The student participants for the interview portion (n = 20) were recruited both via email and via flyers that were distributed throughout the campus. Student survey respondent demographics can be seen in Table 5.

Ten of the 15 (7 full-time and 8 adjunct) faculty teaching in the Fall 13 semester completed the faculty attitude survey. All 15 faculty were teaching for the first time at this university, under a flipped instruction model. The faculty were recruited for both the online survey and the interviews via their university email accounts. Only the 7 full-time faculty were selected for interviews due to the fact that the majority of the 8 adjunct faculty were not scheduled to return the following semester and would have no implementation plan for future courses.

Table 5

Student Survey Respondent Demographics

Category	Demographic	Number
Gender	Male	7
	Female	22
Class Standing	Freshman	22
	Sophomore	0
	Junior	5
	Senior	1
	Unsure	2
Major	Fine Arts	1
	Criminal Justice	8
	Comm Arts	5
	Psychology	6
	Theology	2
	Business	6
	Nutrition	4
	Undecided	2
Number of Classes	1-4	5
	4-7	24
iPad Type	iPad 2	8
	iPad mini	20
	Neither	1

Note. Total number of Major responses listed (n=36) exceeds total number of participants due to some students enrolled in a double major.

Measures

In order to triangulate the results of the data, multiple qualitative methods were used in this formative evaluation based on Russ-Eft and Preskill's (2009) case-study evaluation design due to the need to observe participants in their "natural setting" and where the evaluator had no need to create an intervention or experimental setting (p. 205). The goal of this evaluation method was to develop an overall picture of participants' context within the curriculum model.

Anonymous online student and faculty attitude surveys were sent out via email with two follow-up reminders sent to each group, one week apart, in accordance with a modified Dillman's (2000) Tailored Design method of survey protocol. The questions on both surveys were designed to elicit feedback on the effectiveness of the flipped instruction and problem-based

learning curriculum model on student engagement through methods such as the inclusion of video lectures, preparedness of the students to complete the in-class activities and the dynamics of the group problem-solving activities. To form a complete picture of the three-layered curriculum model, additional questions were asked regarding technology integration. The student survey was an 11-item questionnaire that collected basic demographic data in addition to more specific data about their experience in the classes. One question contained 12 five-point likert-type subquestions asking students to rate their agreement with each statement from strongly disagree to strongly agree. Five open-ended questions were included at the end of the survey.

The faculty survey was an 11-item questionnaire that collected basic demographic data in addition to more specific data about their experience in teaching. One question contained 13 five-point likert-type subquestions asking faculty to rate their agreement with each statement from strongly disagree to strongly agree. Five open-ended questions were also included at the end of the survey.

The students (n=20) were interviewed as part of an open town hall meeting where they were invited to discuss their concerns with faculty and staff, in what was essentially a large focus group. The focus group was asked questions to prompt feedback such as "What do you like most about the lecture-free classroom?" and "What are the areas for improvement in your classes? In the school overall?" Follow up individual interviews were conducted with several students (n=10). Students were solicited at the focus group through an announcement that private, follow-up interviews would be held at their discretion. Students were also informed via university email that individual interviews were being held on a volunteer basis. The interview questions for the individual student interviews were open-ended questions designed to elicit further elaboration on the themes from the survey by asking questions such as "What motivates you most to prepare for class?"; "Do you come to class prepared?"; "What are you generally required to complete before coming to class?" The interview responses to both the focus group and individual student interviews were analyzed for themes and patterns in relation to the curriculum model under procedures for qualitative data analysis set forth by Russ-Eft and Preskill (2009).

Individual faculty interviews (n=8) were conducted with the seven full-time faculty and one adjunct instructor at the end of the semester. The interview questions were based on the curriculum model and designed to determine what elements of the flipped, problem-based learning classroom faculty felt worked well and which elements they would revise for the follow-

ing semester. The faculty were also asked what technology they had used and which they would like to learn more about implementing. Feedback on the utility of the syllabus template was also solicited.

Classroom observations were conducted with each full-time and adjunct faculty member. An observation protocol was developed based on the curriculum model to evaluate the in-class interactions in addition to the administrative portions of the class, such as technology integration, LMS usage, and syllabus design. The observation protocol was designed to determine both faculty adherence to the curriculum model and the effectiveness of the implementation in of the model in the classroom by observing the behaviors of both students and faculty in the flipped classroom setting. Observations were completed for at least one class for each of the fifteen faculty members (n=7 full-time faculty; n=8 adjunct faculty) held on the campus during the Fall 13 semester. Both the course shell within the LMS and the course syllabus were subject to the observation protocol in addition to the in-class activities. Instructors were given no advance notice as to the day or time of the observation in an attempt to preserve an authentic classroom experience for the observer.

Data from the surveys, interviews, and observations were analyzed for themes, as suggested by Russ-Eft and Preskill (2009). Data from the surveys were also descriptively analyzed for frequency of responses.

Results

Student Survey

Of the 79 possible student respondents, only 29 (33%) completed the survey. This low response is consistent with other, less formal surveys that were sent throughout the semester and appears to be typical of this particular group of students. It is also consistent with average student response rates to email surveys at other institutions (Fincham, 2008). In addition, demographic factors may have also contributed to the low response rate. Porter and Umbach (2006) suggested that an urban school with varying racial demographics will likely have low response rates to web-based surveys as a whole.

The possible responses from the likert-type questions, as seen in Table 6, were assigned numerical values from strongly disagree (1) to strongly agree (5) in order to determine means for each survey item. The answers to the open-ended questions were analyzed for thematic elements then grouped by

theme. Eight general themes emerged from the responses, centering around the type and amount of work in the classes and the availability of support for the technology tools. The percentage of responses that were grouped into each theme can be found in Figure 1.

Table 6

Student Survey Responses

Answer Options	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree	Mean
I come to class prepared to discuss the material and complete activities	1	0	2	16	10	4.1724
Interacting with my classmates helps me understand the material	2	0	1	14	12	4.1724
The activities I complete in class help me understand the material	2	1	6	13	7	3.7586
The amount of homework is adequate to help me understand the material	3	2	3	15	6	3.6552
Working in a group gives me the opportunity to teach and learn from my peers	1	2	5	13	8	3.8621
The technology used in class helps me explore the material	1	1	4	9	14	4.1724
I want more technology in the classroom	3	1	14	4	7	3.3793
I want less technology in the classroom	6	8	10	3	2	2.5517
The learning management system, Desire 2Learn, is easy to navigate	2	11	4	8	4	3.0345
My class is lecture-free except for times when the instructor provides explanation or instruction about how to complete an activity or project	2	3	4	14	6	3.6552
I use the iPad for most of my assignments and homework	2	0	4	8	14	4.1429
I actively participate in class, discussing topics with my classmates and completing activities	2	0	2	13	12	4.1379

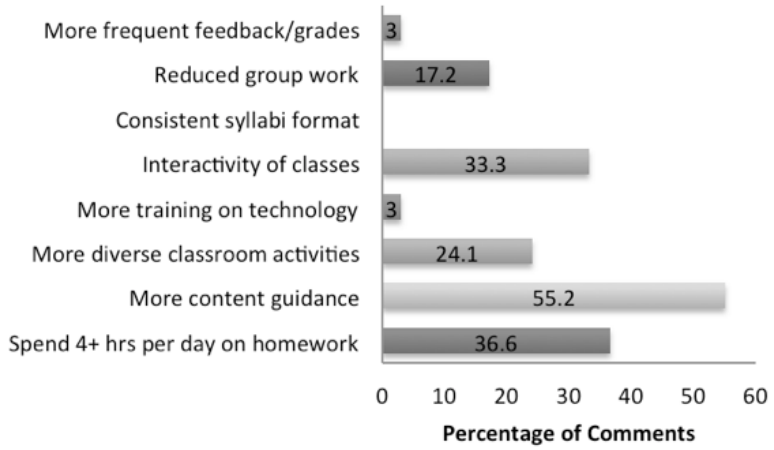

Figure 1. Percentage of open-ended student survey comments by theme.

Faculty Survey

The possible responses from the likert-type questions, as seen in Table 7, were assigned numerical values from *strongly disagree* (1) to *strongly agree* (5) in order to determine means for each survey item. The answers to the open-ended questions were analyzed for thematic elements and grouped by theme. Eight general themes emerged from the responses, centering around the preparedness of students for each class and the amount of preparation the faculty member must do for each class. The percentage of responses grouped into each theme are shown in Figure 2.

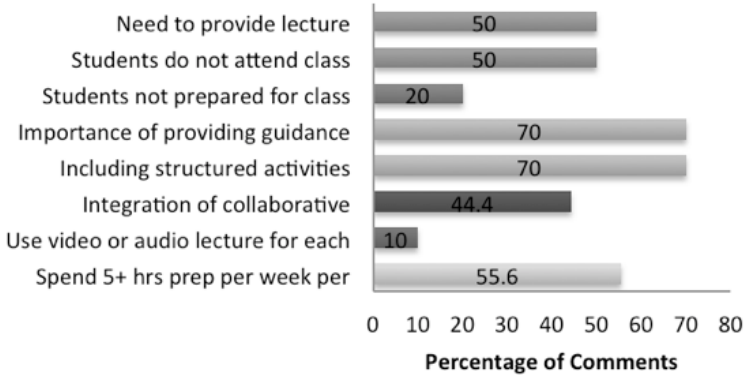

Figure 2. Percentage of open-ended faculty survey comments by theme.

Table 7

Faculty Survey Responses

Answer Options	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree	Mean
I find myself having to lecture more and more in my classes	3	4	0	3	0	2.3
The majority of students come to class prepared to discuss the material or complete activities	1	4	1	3	1	2.9
The majority of students work well in groups without much guidance from the instructor	0	0	3	3	4	4.1
The students appear on-task and engaged when completing activities and assignments	0	0	2	5	3	4.1
The amount of homework is reasonable to help the students understand the material	0	0	1	8	1	4.0
The assignments have shown the students have an acceptable understanding of the material	0	0	4	5	1	3.7
I use as much technology in class as possible	0	1	3	3	3	3.8
I would like to use more technology in the classroom	0	1	3	6	0	3.5
I would like to use less technology in the classroom	1	5	4	0	0	2.3
The learning management system, Desire 2Learn, is easy to navigate	1	3	3	2	0	2.7
My class is lecture-free except for times when the I provide explanation or instruction about how to complete an activity or project	0	0	2	3	5	4.3
The students use their iPads for most assignments and homework	0	0	2	3	5	4.3
The majority of students actively participate in class, discussing topics with their classmates and completing activities	0	0	2	5	3	4.1

In-Class Observations

The results of the observations can be seen in Table 8. Seven (40%) of the classes observed were not using the syllabus template developed for the curriculum model and 10 (67%) did not include pre-recorded lectures as part of the flipped instruction model. In 100% of the classes observed, the in-class assignments were active and encouraged student participation.

Table 8

Classroom Observation Results

Classroom Checklist Items	Yes	No	Not Observed
The Template is being used in D2L, faculty info (contact info, Skype) is updated and current. A welcome message is on the news feed. The textbook is in the coursesmart widget. Grades area is up-to-date. Content is loaded.	11	4	
The syllabus template is being used and all information sections are completed. Syllabus is uploaded to D2L. Calendar of course activities and assignment guides are used and uploaded to D2L where appropriate.	9	6	
Objectives are written using Bloom's taxonomy.	8	5	2
Assessments exist for each objective.	11	2	2
Course has an overall problem for context. Final course assignment is the problem solution.	8	5	2
D2L is used for submission of assignments and communication. Electronic assignments, handouts and texts are used whenever possible.	11	4	
Video or audio lecture capture is used	5	10	
Technology is built into the class activities or assignments	11	4	
Monitors are used to project information about days activity or assignment	10	5	
Instructor engages with the students, clarifying or asking probing questions	14	1	
Students spend class time exploring or discussing topics related to course material	14	1	
Course is lecture-free	13	2	
Students actively participate in the learning experience	15	0	
Students have a problem or issue to work through during class time	12	3	
Students are using the iPads during class to assist in the activities or assignments	13	2	
Assignments or activities are active	15	0	
Assignments or activities use technology	11	4	

Student Interviews

The results of the focus group and the individual interviews were consistent. Students expressed overall satisfaction with the curriculum model and the use of technology. They also stated that there was a need for instructors to define clear expectations and guidelines for courses and assignments through the use of rubrics, learning objectives, and course calendars. Another theme that was expressed by the students both as a group and individually was the need for timely feedback and recording of grades within the LMS. The students also voiced their appreciation for the opportunities to learn through authentic application of real-world problems and scenarios. They indicated that they felt empowered in their own learning but felt that more structure and guidance from instructors is necessary to acclimate them to a college learning environment. In addition, concern was expressed for assigning group grades to group projects and the students stated that although they liked and appreciated group work, they felt that group grading was an unfair practice that rewarded those who did not contribute to the projects and penalized those that completed the majority of the work. A final area of suggestion from the student group was consistency in the use of the LMS and in syllabus design. A reoccurring theme in both group and individual interviews was the dislike of the need to "hunt" to find information in both the syllabus and D2L course shells from one course to another.

Faculty Interviews

The majority of the faculty interviewed indicated that they planned to use the LMS more during the subsequent semester, both as an organizational tool (calendar, document storage) and as a teaching tool (including pre-recorded lectures). One instructor indicated the need to become more familiar with the LMS in order to better utilize the features and another instructor indicated that the students needed similar training.

In terms of problem-based learning feedback, the faculty felt that overall the problems kept the students engaged, but they felt the need to write more focused problems and to spend more in-class time on group activities, such as role-play scenarios, worksheets, and guided discussions that reinforced the content. One faculty member indicated that the in-class activities needed to be more structured and that they intended to provide rules outlining the problem-steps for their courses in the following semester.

As a group, the faculty agreed that they intended to integrate more tech-

nology into their classes during the spring semester, particularly with the addition of lecture-capture technologies. Several requested follow-up training on encouraging the students in effective use of the iPads in class in order to help them move beyond simple Internet searches and word processing.

In terms of the syllabus template design, all faculty interviewed agreed that they felt it was a useful design and that only administrative verbiage on items like attendance, an assignment late policy, and other classroom protocol needed to be added to the template for the Spring semester.

Discussion

Results of this study show that students and faculty responded favorably to the flipped, problem-based learning classroom environment that is technology-enhanced. Survey, interview, and observation data indicate that in a flipped classroom, students may benefit from consistency and high levels organization in the structure of the syllabus and LMS. There is evidence from this evaluation to show that, at least for Freshman-level learners, which were the majority of participants in this evaluation, a flipped learning environment is effective in engaging the learner with the content and in their own learning experiences under the following conditions:

- The active learning problem is a concrete, real-world problem that is well defined
- Instructors provide scaffolding for the problem-solving process, including activating prior knowledge and articulating a rule system for problem solving
- Students work in groups but are graded individually in a timely manner
- Students complete the required readings, lectures and activities outside of class and come to class prepared to interact with the content

These findings are consistent with those of previous studies, indicating the need for scaffolding, well-defined problems, and self-efficacy on the part of the student to prepare for class (Allen, Donham, & Bernhardt, 2011; Hesson and Shad 2007; Hung, 2013; Smith & Cook, 2012).

Survey, interview and observational data show that students were actively engaged with the content both during and outside of class time. The student respondents indicated that they felt "empowered" by the student-centered nature of the curriculum and that they enjoyed applying the content to real-world problems, which again aligns with previous study findings (Goodwin & Miller, 2013; Herreid & Schiller, 2013; Hung, 2013; Sams & Bergmann, 2013; Wiginton, 2013). The faculty interview and survey data indicated that

students were engaged with the content from their experiences, both in and out of class.

Attitudes of Students and Faculty

The attitude of students and faculty regarding the flipped instruction model that integrated problem-based learning was largely positive. The students indicated overall satisfaction, with the desire for more consistency in course design elements like the syllabus and LMS layout and for more explicit instruction in the form of pre-recorded lectures. Faculty indicated that the curriculum model allowed for more active interaction with the content and that the model engaged the students in discussions and other activities leading to problem solutions.

Areas for Improvement

From a curriculum design standpoint, it is clear that the faculty would benefit from further information and practice with using the LMS and in writing both measurable learning objectives and aligned, technology-based assessments. There is a demonstrable need for in-service training on effective technology integration in lessons and activities, in order to mitigate the concerns that technology rather than content become the focus of the classroom. This finding is consistent with Brown's (2012) model of involving the faculty in the instructional design process and the need for extensive training on both the curriculum model and the technology for successful implementation. Although templates and processes were set in place prior to the beginning of the semester, the evaluation showed that the majority of the faculty elected not to use the LMS, the syllabus template, or lecture capture options despite training and guidance from the administration and instructional designer. Several critical elements the design team identified in the curriculum model were missing from the implementation phase. These missing elements directly address the concerns identified in the evaluation, such as the need for some sort of direct instruction via pre recorded lectures and consistency in course organization (LMS).

Although faculty and student opinion was remarkable similar on most questions of the survey, in one area there appeared to be a disconnect between what the students perceive and what the faculty perceive. When asked if they come to class prepared to discuss the material and complete activities, 26 students indicated that they agreed or strongly agreed that they did indeed come to class prepared. However, when asked if they felt the students come

to class prepared, half of the faculty surveyed indicated that they disagreed or strongly disagreed that the students came to class prepared, which supports the findings of Janusa (2014). This difference of perception in preparation may require a more stringent homework policy or in-class participation criteria to be defined. Students may not be performing up to the expectations of the faculty, yet feel that they are adequately preparing for class. A more frequent level of formative feedback in the form of quick knowledge checks may both express the instructor's level of expectations and hold the students accountable for pre-class preparation. The addition of pre-recorded lectures may also ameliorate this disconnect by providing the specific information that the subsequent class will cover in the discussion or activity rather than relying on the student to discern the information from the readings. In addition, the creation of a Freshman Success Seminar where students are supported in the development of study skills, time management skills, group work skills, technology skills, and other college readiness skills was recommended for the Fall 14 semester.

Additional Professional Development Opportunities

Although the inclusion of pre-recorded lectures as part of the flipped model was a requirement set forth by the administration, the 13 out of the 15 faculty (86.7%) were not complying with this component. More emphasis on the importance of this element to the model may be needed to ensure that faculty are indeed providing the appropriate support to the students in the form of pre-recorded lectures. Further research should be conducted to determine the root cause of the lack of pre-recorded lectures in these courses. Despite the fact that faculty were hired with the expectations that this was a requirement of the curriculum model, perhaps there was not adequate support to train faculty on the importance of this element to the flipped model or perhaps the faculty hired had neither the time nor the technology skills to create the videos.

Based on the information gathered in the study, a recommendation was made that faculty in-service training should be afforded a higher priority in the areas of technology/iPad integration and usage, use of the LMS, and assessment. In addition, due to the heavier load of course creation within this model, a limit of the number of courses taught to no more than four a semester is recommended for full-time faculty. Courses created by the instructional designer are recommended for adjunct faculty-led courses due to the amount of time and training needed to create successful courses under this model.

Reflection on the initial semester appears to be a beneficial process to both students and faculty. The opportunity to provide meaningful formative feedback regarding their classroom experiences afforded students a sense of even more control over their own learning. Through the process of reflection, faculty were encouraged to critically think about their course design from a pedagogical point of view rather than one of content. From the faculty interviews, it appears that the critical evaluation of their teaching experiences led them to more seriously consider the tools and training that had been provided to them at the beginning of the semester. At the time of the faculty interviews, which was the end of the semester, faculty were more willing to use the templates designed by the instructional designer and take on the challenge of creating pre-recorded lectures based on the student feedback.

Conclusion

The evaluation of the flipped, problem-based curriculum at this university shows a curriculum model that engages and empowers students to be active in their own learning process. It also shows that a flipped model is feasible in a higher education environment provided that faculty has access to training and resources that allow them to utilize technology tools such as lecture capture and an LMS. From the data collected, it is clear that students in flipped classrooms require structure and support in order to acclimate to the learning autonomy that such an environment provides. Revisions to procedures and curriculum are planned for the spring semester and subsequent semesters. Continual formative evaluations are recommended in order to make evidence-based changes.

The flipped model combined with problem-based learning methods would seem to be an effective and impactful way of encouraging students to reflect on their faith, their place in the community and the service they can provide to others. The opportunities for in-class guided discussion and meaningful activities that the flipped method provides should be considered by other institutions of Catholic higher education as a means to integrate more dialogue and collaboration into the classroom. Creating time to work as an educational community on projects that impact society or the community outside the school walls both supports the mission of Catholic higher education and speaks to the effectiveness of faith-based education combined with using technology tools that can create class time to have those discussions. The challenge of the flipped method, or with integrating any disruptive technology, is how to structure the active learning portion of the learning

experience so that the tenets of Catholic Social Teaching are explored and practiced. In addition, it is vital that the use of this method not create an environment of exclusion due to the technology required to both access the course materials and complete assignments. At this university, students were fortunate enough to have mobile devices available to them. Other Catholic institutions wanting to implement flipped methods must insure that students will have equitable access to the course materials, regardless of social economic status, so that we do not implement "policies, and practices that allow or exacerbate poverty, inequality, and injustice" (Scanlan, 2008).

Limitations to this study included self-reported attitudinal data and low survey response rate. To address this concern, classroom observations were conducted in an attempt to explain the patterns and responses seen in the surveys. Another limitation was the open town hall format for the student interviews. Because faculty was also included in the meeting, it is hypothesized that students might have been reticent in their responses. Follow-up individual interviews were conducted with students to mitigate this effect.

Further evaluations should be conducted on this curriculum model. A study separating the flipped model from the problem-based learning method could be conducted to determine the efficacy of one over the other. Additional studies could be conducted on the motivation levels of students in this type of curriculum and on the possible remediation interventions that would be effective to those students who were struggling in this environment. A study determining the reasons for the low use of pre-recorded lectures by faculty would also assist in revising the curriculum and professional development offerings for future faculty.

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