

Technology Course Transformation: A New View

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Abstract

Failure to provide creative, innovative and transformative business education is having an impact on college and university enrolment and retention. In an article posted on foxbusiness.com, Adam Newman, managing partner at Education Growth Advisors states; "Colleges that fail to focus on supporting, and frankly exceeding the academic needs and expectations of students will do so at their peril given the increasing number of plausible alternatives emerging" (Driscoll, 2013). In order to meet and exceed student expectations, college and university classrooms must accommodate and encourage use of innovative learning technologies and embrace the learning styles of the new generations of students. This article chronicles the transformation of a sophomore level supply chain management course from a traditional lecture classroom setting, to one in which the students are actively engaged in their learning experience.

Keywords: Transformation, Flipped methodology, Blended model, Concept exploration, Experience engagement, Assessment.

1. Introduction

Education, especially at the college and university levels, is in a state of rapid change. As high school juniors and seniors have more savvy when it comes to identifying their expectations for college and/or university offerings. In a 2012 survey of 192,912 first-year students at 238 U.S. four-year colleges and universities, U.S. News & World Report, students were asked to rank the factors that influence their college or university selections choices. When selecting, 68% of the respondents looked for a college or university with a "very good academic reputation" as the #1 factor influencing their decision. (Morse, 2013) Research excellence and influence, selectivity and eventual success are also important factors. Potential students also look for course availability, course variety (within their major) and course delivery methods. Students want education that current, relevant and that provides them with the knowledge and skills necessary to acquire successful future careers. Maintenance of courses that are relevant requires looking not only at what but how the course is delivered. Changing the delivery of course material often requires that the instructor transform their traditional classroom to one that can adapt and adjust to current events and learning methods.

2. Course Transformation Process

In a traditional classroom space students sitting side-by-side in rows facing forward, with the instructor at the front of the room behind a lectern lecturing. This classroom arrangement often described as 'sage on the stage' (King, 1993); leaves students watching their teacher perform, while they sit dazed and unengaged.

There is a growing body of research suggesting that college and university students are most engaged when they are actively integrated in the instructional process. In order to facilitate student integration, educators must design course curriculum with ample opportunities for in-classroom active learning, real-world experiences and student participation reinforcing an independent learning pedagogy. An active learning classroom should also provide support and process modelling that includes time for reflection and concept digestion that is guided by scaffolding tools and prompts. These scaffolding tools should organize and support interpersonal collaboration, provide frequent performance related feedback, and include a chance to practice a variety of cross-curriculum skills such as, writing, presenting, researching, problem solving, team building. (Ewell, 1997)

Recognizing that one of the objectives for any institution of higher education is to improve student engagement and retention, many universities are looking at the significance of classroom transformation as one of the keys to accomplishing this objective. Creating effective learning pedagogies and pliable activity space in which instruction can integrate and adopt new more creative innovative technologies is one approach available to reaching these objectives. Adapting the classroom to incorporate a variety of instructional methods and provide a better match for the broad range of cognitive learning styles of today's diverse student population.

At Purdue University, the IMPACT program has been introduced as a faculty-learning environment platform intended to encourage the kind of classrooms transformation that is in alignment with current literature related to course redesign. From the perspective of many universities, including Purdue, changing or transforming classroom delivery is a critical connection in efforts to attain their student engagement and retention objectives. The mission of the Purdue IMPACT program is "...to improve student competency and confidence through redesign of foundational courses by using research findings on sound student-centred teaching and learning." (IMPACT, 2011) The Backwards Design (Wigging & McTighe, 2005) model takes a "backwards" look at curriculum development in hopes of increasing the students overall academic achievement. Typically, backwards course design involves answering three key questions:

- (1) What do you want to accomplish?
- (2) How do you want to approach it (the redesign)?
- (3) What methods and activities will you use to get there?

Using this backwards curriculum design method, you think first about the desired student outcome or the knowledge and skills that you want them to walk away with, then design your lessons and course materials with this intent in mind. Classroom transformation requires a willingness to change and do things differently, to redesign and rethink the way things are done. The scope of these prescriptions is daunting, and it is clear that such a course transformation requires a planning stage to ensure intended course outcomes align with the course objectives, a time for creating materials and activities that support the outcomes and objectives, and a commitment to gather and study data to revise and improve the design. (Chasteen, Perkins, Beale, Pollock, & Wieman, 2011)

Research-based course transformation has been used for several years at the University of Colorado and the University of British Columbia across 11 departments and has given faculty insights into the process of redesigning courses. The transformation process involves understanding and practicing current theories of the course redesign, clearly defined learning goals, enlisting the support of key faculty members, your department chair and administrators. (Chasteen et al., 2011) It is also important to observe and involve the students in the transformation process resolving course difficulties by: searching the literature specific to the course content, observing and listening to students in the classroom, keeping extensive notes of students questions, looking at common issues associated with homework and exams, administration of surveys, and conducting interviews of students. The transformers search involves spending time gathering curriculum ideas, learning materials, and innovative teaching techniques, researching prominent educational journals, texts and websites. (2011)

Institutional initiatives and support are essential to successful course transformation. "In May 2013, Purdue President Mitch Daniels committed an additional \$2.5 million to IMPACT over the next three years to expand the program to include Purdue's core curriculum of 180 courses." (Reid, 2013) The program is viewed as transformational to the academic philosophy of Purdue. Tim Sands, former provost and executive vice president for academic affairs noted, "The impact of the new program has had an effect on every aspect of success at Purdue." (Sohn, 2013) Faculty engagement in the redesign process needs to be encouraged and modelled starting at the departmental level.

“Here groups and teams of faculty members can engage in collective action to transform pedagogical practices within their respective departments” (Hearne, Henkin, & Dee, 2011, pg.36). Course transformation requires a firm and long-term commitment from all stakeholders at the universities. The literature on redesigning curriculum emphasizes that many changes are needed to make a sustainable and meaningful transformation. A meaningful collaboration between academic departments and the IMPACT program staff is a fundamental requirement for program success. Over the course of this collaboration faculty is taught to adopt a systematic process of adopting educational technology in order to design or redesign their courses (Reid & Attardo, 2013) These changes involve restructuring course schedules, redesigning materials and identifying assessments methodologies, experimenting with new uses of technology and integrating library databases, providing quality training opportunities, and encouraging collaborating and researching. Though educators are increasingly committed to widespread improvements, achieving real change remains complex and challenging.

Administrators and department heads must support the process by creating flexible design and instruction development teams, providing sufficient time for planning, encouraging risk-taking, and realizing that setbacks, problems, and failures are all a natural part of any reform process. (2011) Faculty supports the process by studying research related to literature sharing ideas and new materials, and by working collaboratively to initiate changes that enhance the effectiveness of course delivery. Faculty can also design research studies to share these improvements with the educational communities. Students will need support in their class work and assignments to adjust to the increasing independence and responsibilities in their curriculum. If the changes are across the curriculum the course transformations will be smooth because consistent expectations and effective methodology will reinforce student' roles and foster positive learning gains.

Instructional technology is also an integral part of redesigning a course to deliver content and activities more efficiently. Technology, with the proper support, can enhance student-centred college learning in ways that have not yet been fully realized. For this reason technology professionals are an essential component of any team developing change initiatives (2011). IMPACT also incorporates TPACK (technological pedagogical content knowledge). TPACK attempts to capture some of the essential qualities of knowledge required by educators for technology integration in their teaching practice, while addressing the complex, multifaceted and situated nature of instructor knowledge. Focus on information literacy, space planning, and supporting faculty initiatives. (Maybee, Doan, & Riehle, 2013) Realizing the importance of technology in a students' education, the librarians continue to work with faculty to help incorporate information literacy into each course. (2013)

Flexible scheduling is an important component of a course transformation project. The flipped/blended classroom opens the instruction method to accommodate a schedule that meets university credit-hour requirements and course delivery flexibility. For example it may be beneficial to revise the length of the face-to-face class time to give students additional at-home hours to listen to instructor delivered online lectures, complete readings and assignments, and view supplemental videos in an online supported learning environment. Weekly online curriculum content includes videos, supplemental materials, assignments and quizzes based on the text, are completed outside of the classroom and are organized and presented to reinforce overall course learning objectives. The flipped/blended methodology models of instruction free up class time to introduce concepts using hands-on activities and simulations that are student-centred, engaging, and that require the expertise and support of the instructor. In-class discussions and activities are linked to the online activities and assignments in order to reinforce the online subject matter, resulting in more efficient classroom delivered because students arrive with the background information necessary to participate in class activities. The classroom becomes the place in which students can work through problem solutions, utilize critical thinking skills, advance knowledge concepts, and engage in collaborative learning (Tucker, 2012). This course design method enhances the students' ability to access course materials, apply skills and knowledge and engage with faculty and peers in the classroom. This model is also one that complements the flexible schedule associated with the flipped/blended classroom.

Research on active learning is also relevant to course transformation. Redesigned activities encourage self-regulatory processes, involve guidance for exploration and inquiry, encourage learning from errors, promote upper level metacognitive learning, and require adaptive transfer of existing knowledge (Keith & Frese, 2005; Iran-Nejad, 1990; Schwartz & Bransford, 1998). Active learning methodology requires students to assume increased responsibility and control over their learning while the teacher acts as an expert planner and guide over the instructional design, development and knowledge transfer process.

An effective active learning environment will include a variety of support materials and assignments that prepare the students for the collaborative and metacognitive tasks required throughout the course. Identifying, design and implementation of transformative supply chain management education is the challenge addressed in this project. The objective of this research was to transform an introductory level supply chain management course from a traditional lecture-instructor focused course, to one in which students take an active role in their learning process. Creating a learning environment that is student-centred and in which students participate in topically current, real-world experiences. Brian Kibby, president of [McGraw-Hill Higher Education](#) stated the following; "Students want a good experience but ultimately what they want is a great job, a great opportunity." Student desire a classroom experience that extends far beyond their days in college. "Everything that colleges and universities do should be focused on what is the student's result--if the students don't have results, it's just harder for them to get that return on investment and then ultimately contribute to the global economy." (Driscoll, 2013) Preparing students with experience and skills that will enhance their productivity in the workplace has become an expected outcome of both the student and their future bosses. If students can walk away for the classroom with functional experience and cognitive knowledge, their time will have been worthwhile.

The use of the flipped classroom model would be the most effective approach for the transformation of this course. This model transforms the traditional teacher as "sage on the stage" to the "guide of the side." (King, 1993) In order to accomplish this, the researchers designed and implemented an 8-step process design that would facilitate a continuous improvement loop (Figure 1). The first three steps are enter-related and collectively result in providing transformation direction and improvement. Reviewing the learning objectives of the existing courses is the first action necessary to develop new meaningful course objectives and specific learning outcomes for transformed course and classroom. The review should include a perusal of past syllabi, lectures, assignments, homework, quizzes and exams in order to identify the as-is state of the course. The next step is to decide which materials and concepts utilized in the existing curriculum best facilitate and supplement the objectives of a newly-constructed curriculum and set of activities, and that make an easy transition into new learning outcomes that can be embedded into a student-centred classroom and learning experience. Establishing clear learning objectives and outcomes provide a solid foundation for the transformed classroom, as well as a roadmap for the course and help the instructor to identify potential design pitfalls prior to implementation. Well-sculpted learning outcomes help guide the design revised curriculum focus, maximize student-learning opportunities, create and design student-centred activities and lessons. The revised, more flexible curriculum format also makes room for inclusion of learning materials that expose students to industry current events and maximize opportunities that introduce industry related tools and technologies and workplace skills.

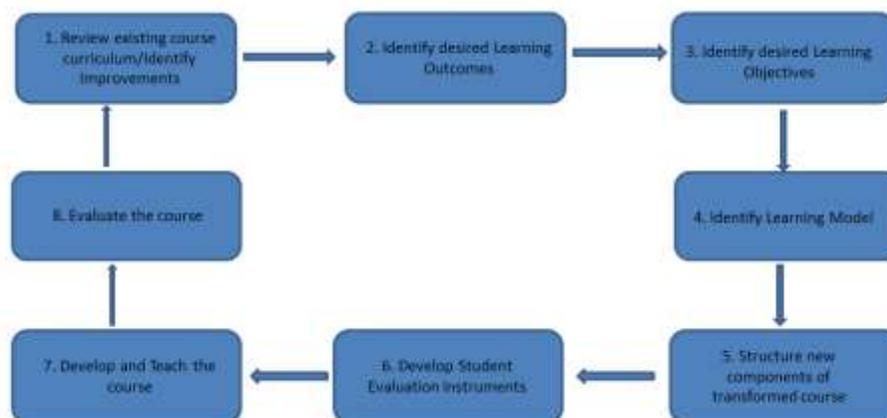


Figure 1: Eight Steps Transformation

Identifying an appropriate learning model for the transformation process is the next. Models considered included; activity based (Savery & Duffy, 2001), project based (Frank, M., Lavy, I. & Elata, 2003), a blended learning model (Rovai, A., Jordan, H., 2004) and the flipped model (Tucker, 2012). "The term blended learning is used to describe a solution that combines several different delivery methods, such as collaboration software, Web-based courses, EPSS, and knowledge management practices (Valiathan, 2002)." Each of these models offered compelling benefits however it was determined that the blended and flipped model provided the best scaffolding approach for accomplishing the goals and objectives identified in the review process step.

Combined these models are flexible and can be easily modified and moulded to generate new classroom activities and curriculum.

Once the model was identified we proceeded on to the development of the pedagogy and structure for the course. We decided to use the syllabus to communicate a clear and simple blueprint of the course and a guide for the students. The syllabus was comprised of a list of the desired learning outcomes; the chapter focus for each week of the term, required and recommended readings and other relevant assignments and activities. The syllabus also contained descriptions of each major learning assessment measures. In order to add clarity to these measures, we divided course requirements into three instructional strategic areas. The first was labelled Concept Exploration. For the purpose of this course Concept Exploration was defined as those learning activities and assignments that were completed individually and outside the classroom. The objective of these activities and assignments was the acquisition of knowledge. This measurement classification was designed for delivery via the universities on-line server and contained topic related materials, recorded lectures, supplemental information often in the form of videos, and work assignments. Examples of these assignments include written reflections of in-class activities, assigned case study reviews, and weekly quizzes. These on-line assignments allow students to complete out-of-class learning at their own pace and places the onus for completion of all basic course requirements on the student, thereby freeing the instructor to use in-classroom time to engage student in a series of cognitive learning experiences such as skill-application, analysis, synthesis and evaluation of the course materials that are introduced in the Experience Engagement strategy area.

Experience Engagement was defined as the in-class, experiential learning activities. In-class activities posed additional design challenges primarily because of the fluid design of activities that meet the specific needs and learning outcomes for each lesson and the goal of supporting all of the department core curriculum concepts and objectives. The face-to-face time allotted for this course is limited, in this case 50-minutes. In a best-case scenario students would have completed the readings and other associated concept assignments prior to the upcoming class meeting, ready to dive-in to the day's activities. Examples of in-class activities include: using a design case to create a process map, group problem solving activities, designing a supply chain map, and participating in a hands-on ERP-SAP simulation. The Experience Engagement assessments give students actual hand-on experiences that are reflective of the 'real-world' business and industry practices that they may face.

The final course assessment assignment is the SCM Research and Presentation assignment. The purpose of this assignment is to challenge students to think critically about and apply SCM the concepts, content and experience activities utilized in the course, to address and understand how SCM impacts the global business environment. Students work in randomly assigned groups researching and preparing a written report and deliver a group presentation using technology such as audio enhance power point presentations or a live recording of the group presentation in order to deliver their research findings. Integrating the use of technology to deliver their findings encourages students to be creative and to manage the additional challenges of communicating in a global environment.

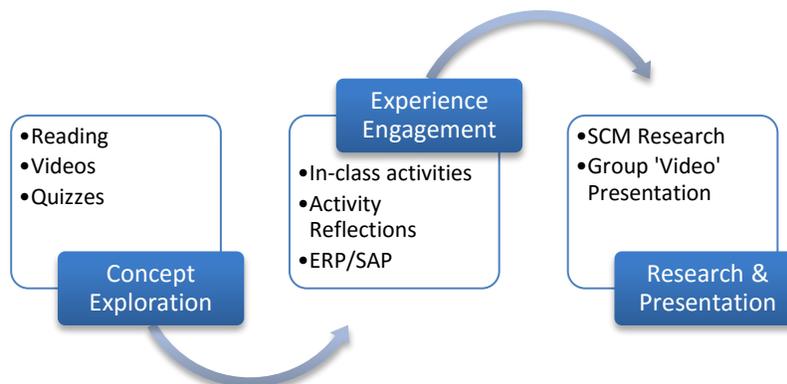


Figure 2: Weighted Assessment Measures

An assessment and evaluation strategy should be integrated on the front end of course transformation process. Measurement is a critical component in accomplishing the core competency of an effective course transformation processes. Without assessment and evaluation of the course content and course instruction, there is no real understanding of what is worked or did not work, and there is no platform for continuous process and learning improvement.

Assessment is defined as “A set of processes designed to improve, demonstrate, and inquire about student learning” (Mentkowski, M. qtd. In Palombia, C.A. and Benta, T.W. 1999) and evaluation as “the systematic process of determining the merit, value, and worth of someone (the evaluatee, such as a teacher, student, or employee) or something (the evaluand, such as a product, program, policy, procedure, or process).” (Evaluation Glossary, n.d.) Assessment is a check and balance point for measuring and managing the overall effectiveness of the course transformation.

Course transformation is at its foundation about enhancing the effectiveness of the learning experience of the students and the only way to assure the effectiveness of a transformed classroom. The ability to assess and measure the effectiveness of the changes provides clear direction for the instructor’s efforts to ensure that the course is relevant. Knowing whether you’ve got the course and curriculum right and/or identifying areas for improvements is the key to successful learning. “Measurement is the first step that leads to control and eventually to improvement. If you can’t measure something, you can’t understand it. If you can’t understand it, you can’t control it. If you can’t control it, you can’t improve it.” (Harrington, 1991) Assessment of the student-user is best judge of the effectiveness of the course materials and the delivery method. Student-assessment establishes a solid foundation for continuous and systematic course improvement.

Integrating assessment tools and processes from the onset of the transformation is the only truly effective way to confirm the implementation of affecting change and improving. Evaluations methods for this course transformation occur at multiple touch-points and include; activity reflection assignments, quizzes based on textbook readings, and a SCM research report. Activity reflections are written responses to questions about the in-class exercises. These reflections provide the instructor with feedback and a sense of the activities effectiveness. In other words, did the student make the connection between the in-class experience and the pre-class concept exploration assignments?

Another assessment tool utilized in this course transformation is the weekly on-line quiz. These weekly quizzes are based on textbook and supplemental readings and are completed electronically. The textbook and supplemental readings, along with the videos and on-line topic presentations or lectures, are the knowledge sources of the concept exploration. Finally, each student will work with a team of students researching, writing and presenting their findings in class. This team project is designed to encourage students to use their leadership and team management skills, to improve their investigative skills and practice communication and presentation skills.

The cumulative results of scores from the three evaluation categories, Concept Exploration (on-line assignments), Experience Engagement (in-class activity participation and reflections) and Research & Presentation (final group activity) are weighted and used to calculate the final grade.

3. What we learned

Though grades are an assessment tool for the course, feedback from the students has been the best measure of the effectiveness of the course, therefore our students are asked to complete two end-of-semester course evaluation surveys, one University hosted and the other hosted by IMPACT. The University hosted survey focuses on general student satisfaction and instructor effectiveness, while the IMPACT survey seeks input related to the course delivery effectiveness. In addition to standard Likert scale style questions related to the instructor, course content, course delivery style, and course value, both survey’s ask students to comments and make suggestions about what worked and what didn’t work and what they believe could help improve the course. Results from these evaluations are passed on to the instructor in an anonymous format following the semester, and can be utilized in capturing the student’s perceptions about the courses effectiveness and to identify potential course changes and enhancements.

In general the responses to this course transformation have been positive. The following are student samples of comments retrieved from surveys over three semesters. The surveys are distributed to all university students via email at the end of each semester. First, a few of the comment related to the flipped/blended course format:

3.1 Flipped Model

- “I love the flipped environment. It allows me to do menial things like reading on my own time, while we do hands-on activities while in class.” (*Fall, 13*)
- “I really like taking a flipped class, it took a lot of weight off my shoulders and allowed me to manage my time well with other classes.” (*Fall, 13*)

- “I enjoyed this type of class. It was different than anything I’ve ever had at Purdue.” (*Spring, 13*)
- “I liked the flipped aspect of the course!” (*Fall, 13*)
- “This ‘Impact’ course as I think it is called, whatever the name is, is an excellent teaching format. I have taken a course this way...and the teaching environment drastically enhances my learning. Purdue should look into increasing the amount of classes offered this way exponentially.” (*Fall, 13*)

These comments related directly to the flipped and Impact class delivery method suggest that students enjoy the interactive nature of the course, that students are willing to share responsibility for their learning and that they are actually learning. The flipped course environment is heavily dependent on developing course content and activities that engage the students and clearly link to and address course subject matter. The following comment will focus on the class activities and content:

3.2 Course Content

- “Activities we do in-class are relevant, fun, and help the learning experience of the overall class.” (*Fall, 13*)
- “I love the amount of interaction that happens in the class. It’s not just lecturing all the time we are actually doing hands on activities to apply the material that we have learned.” (*Spring, 14*)
- “Doing things hands-on helps me learn therefore I took away a lot from this class.”
- “Assignments are appropriate for material to be learned.” (*Fall, 13*)
- “I liked the real world experiences and how the information will be applied to that (real world).” (*Spring, 14*)
- “Very active within class activities and everything is clearly explained about what is expected out of us and that makes the class much easier.” (*Spring, 14*)

Preparing materials for a flipped course delivery will take time. The instructor needs to make sure that the online segment of the course, the lectures, text readings, videos, supplemental readings, and quizzes, correspond with in-class activities, assignments, and group activities. It is also important to ensure that the course is constructed in a way that allows course goals and outcomes to be met. Finally, a flipped course requires an instructor to be open to doing things differently. Instructor involvement in every class meeting is paramount to the success of the flipped delivery method. Any faculty considering implementation of a flipped course must be organized, ready to change and willing to engage directly with the students.

3.3 The Instructor

- “The instructor does a good job of announcing ahead of time when we have assignments or quizzes due.” (*Spring, 14*)
- “The professor introduced a activity and we worked on the activity as a class.
- “...great about walking around the classroom and making herself available to students with questions.” (*Fall, 13*)
- “I like how the instructor keeps class moving at a fast pace. She knows what she wants to get done in class and we always get it done...” (*Fall, 13*)

The transformation of any course cannot happen without the instructor’s commitment to change. Developing and organizing course materials, being prepared well ahead of time for each class meeting, and managing the class in both the on-line and face-to-face, in-class sessions. Course transformation is a time-consuming endeavour requiring extensive planning and effort. It is important to note that this course transformation could not have been accomplished without the support of a dedicated teaching assistant and university course development experts. Having a team of individual working on the course was essential to the successful implementation of this course transformation.

Not all comments associated to the format of this class were positive, however even those comments were helpful in the on-going desire to improve the course. The following are a few of the criticisms of the course and the format.

3.4 Criticisms: Continuous Improvement

- “I would have a real class format for those that do not want to take the distance learning.” (*Spring, 14*)
- “Have it (the class) two times a week instead of one.” (*Fall, 13*)
- “The class only meets once a week for 50 minutes, and I do not think enough in class time for this course.

The exercises and presentations could have had larger impact on my learning experience if the class met 1 more time throughout the week, or the class could have met once a week for an hour and 20 minutes.”

(Fall, 13)

Course transformation should not be viewed as a one-time event. Understanding what works and does not work is equally important to delivering the next successful course. Reviewing and analysing data collected from the students at the end of each semester is important in that it provides useful information when working on enhancing the course. In addition to the information collected from the official university evaluation, the instructor can integrate course assignments, activity reflections and discussions, both formal and informal, as data collection resources. The key is to make each of the eight steps of course transformation a regular part of the course development and preparation process.

4. Lessons Learned

The transformation of traditional lecture courses to one that is a combination of both active and distance experiences requires balance between extensive pre-planning and assessment. Documenting each class sessions, what worked or didn't, using a journal or another documentation tool is important to the continuous improvement process. The documentation should include results and observations of both the online and in-class assignments and activities and a review of the objectives, expected concepts and skills, and how each lesson creates a bridge to the course learning objectives. This journal will enhance the ability to assess the effectiveness of the course as well as providing a platform of support for continuous course improvements. Resources may be found through college or university resources, in teaching workshop and training events. Purdue has the Center for Instructional Excellence, CIE. Services provided through the CIE include workshops, an information vault of teaching tips, tools and services, and a support staff that is trained to help faculty design, assess and manage course development and manage a sustainable teaching model.

Whether this is the transformation of an existing course or the development of a new one, including an assistant to go through the process, from development through implementation, with you is another important tool for effectiveness. For example, having a graduate assistant (GA) or teaching assistant (TA) involved in the process from the very beginning has immeasurable benefits. The GA or TA can participate instructor training and workshops with the instructor. Having this kind of support is an invaluable asset in the development of the course. Having an additional pair of eyes to observe and record student activities, and review the student's work provides a broader understanding of what is effective and what should be revised or removed. Supportive contributions from a creative source can make the difference between good and great.

5. Conclusions

Course transformation is challenging and a never ending process when done correctly. Knowing where and what you want to accomplish through the transformation is the first question that you want to answer. Clarity about the direction that you want the course to head in and having sight of the desired goals, objectives and outcomes is important to effective design and instruction.

Transforming a course is challenging but rewarding especially when the feedback is immediate. Overall feedback from students who have participated in this transformed class has been positive and the criticism is been beneficial to understand how the course can continue and grow. Generally students express an appreciation for the flipped classroom model stating that they like the applied and interactive nature of the course. Implementation of a course that has been transformed requires a willingness to be flexible and open to doing things differently. The transformed classroom can have a profound impact on the classroom experience. The flipped model used for this transformation provided a platform from which student are able to monitor learning and growth while simultaneously giving the instructor measurable feedback that leads to continuous course improvement.

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