

FUSION TEACHING: UTILIZING COURSE MANAGEMENT TECHNOLOGY TO DELIVER AN EFFECTIVE MULTIMODAL PEDAGOGY

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ABSTRACT

Fusion teaching merges several pedagogies into a coherent whole. Course management technology allows for the digitization and delivery of pedagogies in an effective and exciting manner. Online course management options more easily enable outcome assessment and monitoring for continuous improvement.

INTRODUCTION

Fusion teaching is the practice of unifying several pedagogies. Course management technology (CMT) is an effective mechanism to merge several pedagogies within one course. Fusion teaching will result in higher levels of student engagement, satisfaction and learning.

With an increase in class size and diversity, developing an effective teaching strategy is essential since student age, gender, ethnicity, personality, and learning style vary within the same class. Enabling fusion teaching with course management technology will allow instructors to implement a variety of pedagogies that directly involve students in learning.

Factors that could nudge instructors toward a fusion teaching approach include research findings from higher education literature on teaching and learning, the variety of choices among instructional pedagogies, and course management technology platform alternatives. Student achievement and student satisfaction data provides support for the fusion teaching approach. The

approach is definitely beneficial, but not without challenges. Several next step suggestions will be made for instructors seeking to implement fusion teaching in a classroom setting while attempting to avoid both real and perceptive obstacles.

TEACHING AND LEARNING LITERATURE

Course management technology can blend teaching and learning theory in a manner that augments a multiplicity of outcomes. Student learning and satisfaction are both desirable outcomes of collegiate coursework. Student learning is an obvious desirable outcome, but satisfaction is particularly important to tuition dependent private institutions.

Teaching and learning literature identifies several learning models. Course management technology is able to incorporate aspects of at least four popular models: Blooms Taxonomy of Educational Objectives, Finks Taxonomy of Significant Learning, Kolb's Experiential Learning Styles, and Pine and Gilmore's Experience Realm model.

Academic learning models focus on how students learn in an academic setting. Bloom's Taxonomy (Bloom, Englehart, Furst, Hill, & Krathwoh, 1956), one of the earlier models, was a criticism of traditional education that primarily focused on lower-order processes. Bloom's Taxonomy acknowledges the lower-order processes such as knowledge, comprehension and application; but the model includes the higher-order processes of analysis, synthesis, and evaluation.

Due to limitations in the original Bloom's Taxonomy, Fink (2003) came up with a successor known as the Taxonomy of Significant Learning. In modern society, certain skills not easily reconciled with Bloom's Taxonomy are now needed. These skills include leadership, communication, ethics, and adaptability. Fink discarded the hierarchy of Bloom and used the following learning domains: learning how to learn, foundational knowledge, application, integration, human dimension, and caring. The key to the model, though, is that significant learning occurs when more than one domain is synergistic with another domain.

A competing learning model is Kolb's Experiential Learning Model (Kolb & Fry, 1975). The model is composed of four elements; concrete experience, observation and reflection of that experience, formation of abstract concepts, and testing of these new concepts. Related to the model are learning characteristics such as learning is a continuous process grounded in experience. Further, learning is by its very nature full of tension. And finally, learning is the result of the transaction between social knowledge and personal knowledge.

A different take on experience comes from the work from Pine and Gilmore (1999). Their work is not an academic learning model per se but it is relevant to the classroom, when the topic of student satisfaction is examined. Pine and Gilmore theorize that customers will pay well for an amazing experience or an experience that is transformative. Except for examples found in movie clips or YouTube clips, most lecture experiences do not rise to this level, but an innovative course delivered in an unexpected manner can deliver the value added that many students desire.

Higher education should be more than providing a service. Pine and Gilmore suggest service enterprises should re-contextualize offerings to create experiences for purchasers. The Experi-

ence Realms model asserts that service providers can structure purchaser interactions from passive to active involvement while connection with the service can range from immersion to absorption. Memorable experiences occur when the service is able to convey a balance of these ranges within a service offering. For example, college classes may be more memorable when the degree to which involvement or absorption vary from one assignment to another.

The learning models give a framework and rationale for attempting to fuse a variety of digital pedagogies into one course with an online technology platform (Jung, 2011). Using a digital environment to convey the lessons of the learning models has its supporters (Scardamalia, Bereiter, McLean, Swallow, & Woodruff, 1989; Schneiderman, Borkowski, Alavi, & Norman, 1998). Fusion teaching is an architectural approach to course design that is capable of encompassing elements of each of these learning models in order to positively influence both cognitive and affective domains (Tsai, 2011). Fusion teaching will allow students to focus on teaching and learning modes that connect to personal preferences, an approach that is made possible by course management technology (Schneckenberg, Ehlers, & Adelsberger, 2011).

COURSE MANAGEMENT TECHNOLOGY

Course management technology has become an increasingly important mechanism to deliver coursework in higher education (West, Wad-doups, & Graham, 2007). We believe that course management systems have been underutilized (DeNeui & Dodge, 2006). Certainly, many instructors use CMT, but the majority may not use it effectively, consistently, intensively, or taking full advantage of available features (Beatty & Ulasewicz, 2006). We are able to incorporate a greater variety of pedagogical modes while releasing in-class time to active learning activities by moving more assignments to an asynchronous environment. The use of multiple pedagogies online may exceed what is pedagogically possible in the classroom alone and may go beyond what is typically familiar to some instructors.

Today, most CMT software includes tools that allow for course content organization, presentation, communication, assessment and grading. Further tools, such as live chat, discussion forums, and collaboration functions permit the

instructor to manage class materials and activities. We believe that CMT packages have been underutilized, despite the availability of a variety of CMT vendors.

There are several CMT vendors in the market but the leading providers are Blackboard, Moodle, Desire2Learn, and Sakai. In the 21st National Survey of Computing and Information Technology in American Higher Education (Green, 2010), the report highlighted a shift away from the market leader of Blackboard. The survey results showed that Blackboard's share of the market had fallen from 71 percent in 2006 to 57 percent in 2010. Thus, the other vendors had all increased their market share in this time frame. Moodle had gone from 4 percent to 16 percent. Desire2Learn had risen from 2 percent to 10 percent, and Sakai had gone from 3 percent to 5 percent. Thus, the leading competitors to Blackboard had gone from 9 percent market share in 2006 to 31 market share by 2010.

These four popular packages tend to offer a similar gamut of tools and features, the pros and cons of using a course management system will be discussed in a general sense as opposed to doing some sort of comparison matrix. The primary pros of using course management technology are the following - instant feedback to students, educator time savings, and a variety of learning tools. The cons of using a course management system are restrictions on academic sharing, certain costs, and lock-in choice. Restrictions on academic sharing refer to the situation that students often cannot access the materials once the semester ends. Costs include total cost to operate, so a free package like Moodle will still have associated infrastructure and support costs. Lock-in choice means that the competing packages have different menus and navigation tools. Educators and students can be reluctant to migrate to competing packages because they are so familiar with the existing package.

Course management technology will transform student learning by enabling of a variety of pedagogical modes. For example, if some portion of routine lecture-presentation-explanation of textbook materials is made available online, then devoting more in-class time to some interactive or high-impact learning activities that correlate with greater student satisfaction is possible.

Consequently, the role of a faculty member changes from a source of information to a coach

in the learning process. Providing students with the auto grading of online assignments along with instant feedback on mistakes will reduce the amount of faculty time dedicated to the sheer clerical nature of grading. Instructors are then able to give both individuals and small groups the attention they want at far less cost while helping students to focus on particular areas of individual improvement.

INSTRUCTIONAL PEDAGOGIES

Fusion teaching is a pedagogical approach which is able to deliver several instructional techniques, assignment types and assessment mechanisms through a common online digital portal. The portal provides a gateway to a variety of technologically infused pedagogies. For example, instructors and students can choose among audio or video clips, static or animated graphics, and fixed or algorithmically regenerative calculations.

A course management technology platform will allow instructors to offer students an assortment of assignments that will improve both learning and satisfaction. The more diverse the assortment, the more likely a student will be able to connect with her learning style, reach higher levels of cognitive ability, bring about engagement at a more emotional level and experience significant learning. Students consistently score electronic classroom experiences higher on course evaluation questionnaires for interest, motivation and learning in comparison to a lower score for traditional classroom experiences that may largely embody a lecture approach (Schneiderman, et al., 1998).

A wide range of digital assignments are possible, such as narrated and non-narrated PowerPoint slides, video cases, discussion boards, hyperlinked texts, audio and video lectures, pre and post testing, short answer questions, essay questions, objective testing, breaking news, surveys of student opinion, RSS feeds, Web links to resources as well as current events, movie and music clips, synchronous class meetings, and interactive graphs and equations. Additionally, social media such as Facebook and Twitter could also be imbedded into the online course design. The range of possible assignments could be required or may be available as options to students wishing to choose activity types that best match their learning interests.

A further variety of assignments could be incorporated into the course grade or could be designed as a self-paced study aid. Hints, explanations and answers to assignment questions may be revealed or hidden. Flash cards can be embedded into the CMT. Nearly all major providers of study materials for national professional exams (e.g. CPA exam, CFP exam, etc.) sell flash cards to exam candidates. A student could assess her own progress in the course by reviewing elements of the grade book, performance on assignments or answers to particular questions. By digitally delivering a variety of instructional pedagogies through course management technology, a greater likelihood may exist to achieve sought after educational objectives that emerge from the literature of teaching and learning.

SUPPORTING EVIDENCE

A fusion teaching approach utilizing course management technology finds evidentiary support for beneficial cognitive and affective classroom outcomes. We seek to assess both student satisfaction and knowledge in college level Principles of Macroeconomics and Principles of Microeconomics courses. For student satisfaction we rely on a questionnaire along with unstructured interviews and for student knowledge we rely on topic examinations within a course as well as the administration of a national exit exam.

Our qualitative assessment suggests that students in fusion taught courses regularly spend more time studying, are engaged with a variety of learning activities, are able to comprehend the material more thoroughly, connect with pedagogies that are a best match for the learning style of the student, and are actively involved in self-driven learning assignments that assist in mentally anchoring material rather than passively sitting and listening to material that may then be more easily forgotten. Moreover, the level of communication increases not only with the instructor but also among the students.

Our quantitative assessment reveals that students enrolled in fusion taught classes spend on average 6 hours a week with the required online course components in a typical three semester hour class that also meets two and a half hours a week for lecture-presentation. The total number of questions that can be used to assess student performance has risen from 300 in a paper and pencil in-class testing environment to approxi-

mately 2,100 in a digital environment. Student comprehension has increases across 33 separate topic areas designated as essential to understanding economic principles. Table 1 identifies some of the topic areas with the corresponding percent of students answering these questions correctly.

Concept	Percent Correct
Marginal Costs and Benefits	91
Elasticity	85
Perfect Competition	85
Aggregate Supply and Demand	84
Gains from Trade and Economic Welfare	84
Scarcity, Tradeoffs and Opportunity Costs	84
National Income, Productivity and Growth	82
Supply, Demand and Market Equilibrium	82
Costs of Production	81
International Trade and Finance	81
Oligopoly	80
Money, Banking, Monetary and Fiscal Policy	79
Monopolistic Competition	77
Monopoly	77
Cost of Living	75

Table 1 allows for closing the loop in a continuous improvement process. Pooling class level aggregate data provides an understanding as to what topics are well understood and those that need more attention from instructors. Individual instructors as well as departments or coordinators of required multi-section courses could develop and implement a plan to improve student performance on a certain topic. Assessing the implementation results is then possible to determine if the objective has been met.

Using an iterative process of establishing learning objectives, measuring performance, identifying the gap between actual and benchmark student understanding, developing and implementing an improvement plan and then assessing the effectiveness of the plan, our performance on a nationally standardized exit exam boosted student

knowledge from the 45th percentile nationally to the 85th percentile within five years. Furthermore, scores on a course-level comprehensive final exam that covers all topics taught during a 15 week course results in 80 percent of test grades ranging from 85 to 94 percent correct.

Coincident with this rise in performance is a rise in student satisfaction. On average, students rank their satisfaction with a fusion taught course nearly 20 percent higher than a comparable non-fusion taught course. Echoing this satisfaction are written student comments on a course evaluation such as: I liked using [the CMT], it was very helpful!; I loved the online testing, I think this helped me learn the material better; I loved the fact that we had a pre and post-test with each chapter; I like the fact that our work is online; the [CMT] was very helpful, helped me learn.

BENEFITS AND CHALLENGES AND INSTRUCTOR IMPLEMENTATION

Our experience suggests that fusion teaching leads to an increase in student learning, satisfaction, engagement, communication and interest in taking additional upper-division courses in economics. Course management technology has provided an impetus for course innovation, faculty collaboration, more data gathering for assessment purposes, documentation for assurance of learning standards, and an efficient curriculum evaluation process that leads to continuous improvement.

A fusion teaching approach is not without challenges. Some forethought and planning could help to: avoid slow connection speeds off campus, provide personal computer software updates, offer a 24/7 CMT help line for those needing assistance, prevent user unfamiliarity with a CMT environment, keep users abreast of CMT updates and options, overcome difficulties in downloading materials, limit the sharing of online work among students, reduce the incidence of academic dishonesty, and help to minimize the initial time commitment for faculty contemplating a more intensive use of CMT and to provide ongoing support for updating existing courses.

Faculty support for intensive CMT use should not be underestimated. Technical difficulties can reflect poorly on the instructor and make dodging experimentation with CMT a safer option for the instructor. Student support is parallel

to this concern in that students encountering a poor experience will often approach the instructor for a solution.

Implementation of a fusion teaching approach requires a time commitment to design a course with CMT. The process of regeneration is continuous and incremental after the initial course set-up. Digital courses can get better with age, but do require some pruning of previously posted materials while simultaneously cultivating new materials. The iterative course assessment process previously mentioned provides the feedback to determine which pedagogical materials to keep or discard.

In implementing a fusion taught class we suggest that students be provided with a CMT orientation session so they can become familiar with the features of the system that will be utilized in the course. Inevitably, students will have questions or unanticipated problems with CMT. Consequently, the availability of an assistance whether by email, instant messaging or phone should be anticipated, provided and conveyed to users on how to access the assistance.

A perpetual concern is how to reduce the incidence of academic dishonesty among students. For example, using algorithmically regenerated questions, varying the response order of questions, setting assignment time limits on assignment availability, using a subset of questions for an individual evaluation where the subset varies from student to student, monitoring the time spent per assignment, tracking student progress and establishing submission deadlines should mitigate academic dishonesty.

Additionally, some course management systems provide for browser locks so that students cannot access any other materials on a computer or on the Web while engaging an online assignment. Furthermore, the use of an in-class comprehensive final exam that is a significant component of the course grade should deter dishonesty if the path to get the best grade requires a diligent, ongoing, honest effort with the online materials throughout the entire semester.

Designing courses to encourage a diligent semester long effort is possible when considering the structure of assignments. Materials could be assigned for each chapter or topic. A pre and post-test could be available as well as chapter quizzes and exams that cover a range of pedagogies such

as calculation questions, flashcards, drop and drag graphic questions, and audio or video clips. Some of the assignments may be due prior to an in-class lecture-presentation-application while others could be due after the in-class meeting. By specifying due dates and incorporating some attempts or scores into an online grade book, the CMT will encourage students to keep pace with the class.

SUMMARY

Fusion Teaching transforms the way learning occurs by allowing students to connect with pedagogies that are helpful to their understanding. The evidence reveals that when students are actively involved in learning activities, they learn more and remember it longer than when they are passively sitting and listening. Alternatively, the instructor may deal less with routine inquiries becoming more of a supervisor of the learning process rather than a source of information. Furthermore, the instructor may devote more class time to in-class activities and applications in order to capture student interest.

In the words of Ben Franklin, "Tell me and I forget. Teach me and I remember. Involve me and I learn." Our experience suggests that the mediation of fusion teaching with course management technology will engage students, increase satisfaction and improve learning while enhancing instructional effectiveness.

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