Implementing a Flipped Classroom: An Instructional Module

Dean N. Shimamoto
Department of Educational Technology
University of Hawaii Manoa
Honolulu, Hawaii, U.S.A.
dshimamo@hawaii.edu

Abstract: Flipped classrooms are shifting the way teachers provide instruction by inverting traditional teaching methods to engage students in the learning process. Using technology, lectures are moved out of the classroom and delivered online as a means to free up class time for interaction and collaboration. In order to effectively implement a flipped classroom, teachers must possess a set of requisite technical skills, conceptual knowledge and pedagogical expertise. Through this study, a web-based instructional module was developed to provide this information to prospective teachers interested in implementing a flipped classroom. Results indicated that the module was effective in delivering an overview of the required material, but could have benefitted from the inclusion of added examples of working implementations to raise the confidence level of the participants. Added support through a learning community, either in-person or online, would help to provide guidance through initiation and expand on the shared experiences of the individuals.

Introduction

For years, teachers have filled the role of "sage on the stage" imparting their wisdom during allotted class time then sending work home to reinforce learned concepts with minimal or no added support (King, 1993). As a result, students were left on the receiving end of a one-way communication process that did little to promote social interaction or encourage critical thought.

Passive by nature, this model of teaching, known as the transmittal model, assumes students as empty vessels into which knowledge is poured (King, 1993). Information, once acquired, is stored without relevance and left unchanged over time. Though common, this model does little to effectively prepare today's students for a future where success relies on one's ability to think independently, solve unexpected problems and deal with complex issues.

By contrast, the constructivist model presents learning as an active, social process in which learners use existing knowledge and prior experiences to build an individual understanding of new material (Brown, Collins, & Duguid, 1989). Teachers act as facilitators, guiding students through the learning process while allowing them to shape

their own understanding of the instruction (Rhodes & Bellamy, 1999). By doing so, students are able to actively construct knowledge in a meaningful manner that allows them to both better understand and process the learned content.

As a means to integrate the constructivist model into their classrooms, teachers are now utilizing technology to implement a blended learning method that shifts lectures out of the classroom and on to the internet in order to free up class time for collaborative activities. This inverted method, known as a flipped classroom, combines the benefits of direct instruction and active learning to engage students in the educational process.

Though simple enough to understand, flipped classrooms are not quite as simple to implement due the range of technical skills, conceptual knowledge, and pedagogical expertise required to execute the varying aspects of the method. Therefore, the purpose of this instructional design project was to develop and evaluate a web-based module for teachers at a private, college-preparatory institution to effectively implement a flipped classroom in their courses.

Background

Pioneered by chemistry teachers Tom Bergman and Aaron Sams of Woodland Park High School in Colorado, flipped classrooms use technology to invert the traditional teaching environment by delivering lectures online as homework and opening up the class period for interactive learning (Tucker, 2012). Through this method, teachers record their lessons using simple video capture software, post them to the internet and assign the recordings for online viewing prior to class. By delivering the lecture beforehand, scheduled class time is made available for collaborative activities. This shift allows instructors to transition out of their role of "sage on the stage" and become facilitators, or "guides on the side" thereby allowing students to move away from being passive listeners and becoming active participants in the learning process (King, 1993).

Research indicates that compared to those in traditional lecture-based classes, students in active learning environments show improved retention and better conceptual understanding of learned material (Sezer, 2011). These results are attributed to the contrasting roles of passive and active learners in the educational process. While passive learners exist solely as receivers, active learners are full participants in the process, allowing them to add to their retentive capabilities through continued self-reinforcement (Petress, 2008).

Though shown to be effective once established, active learning environments are not generated spontaneously. Teachers must work to develop these environments through the use of proper motivational strategies and active promotion of social interaction. The ARCS model provides teachers with a systematic approach to design instruction that addresses the four major components affecting motivation – attention, relevance, confidence and satisfaction. Addressing these components builds intrinsic interest in the material and stimulates students' motivation to learn (Keller, 1987).

In promoting social interaction, the establishment of collaborative learning communities is essential. Through these communities, the social aspects of everyday life are utilized to acquire knowledge on a given topic, thereby turning education into a natural process (Wenger, 1998). With each interaction, learning takes place in an informal environment that reduces the need for traditional lectures.

Methodology

With interest in flipped classrooms building over the last year, coverage has increased significantly, yet despite the wealth of information now available, instruction on how to start the implementation process is severely limited. As a means to fill that void, an instructional module was created to provide interested teachers with a comprehensive online resource to begin flipping their classrooms.

To provide participants with the requisite technical skill, conceptual knowledge and pedagogical expertise to effectively implement a flipped classroom, a flexible web-based platform was used to accommodate the range of content being offered (Figure 1). Along with text and visual diagrams, videos were identified and presented to address the alternative learning styles of the participants as well as improve understanding by providing a new perspective on the material (Herder, Subrahmanian, Talukdar, Turk & Westerberg, 2002)

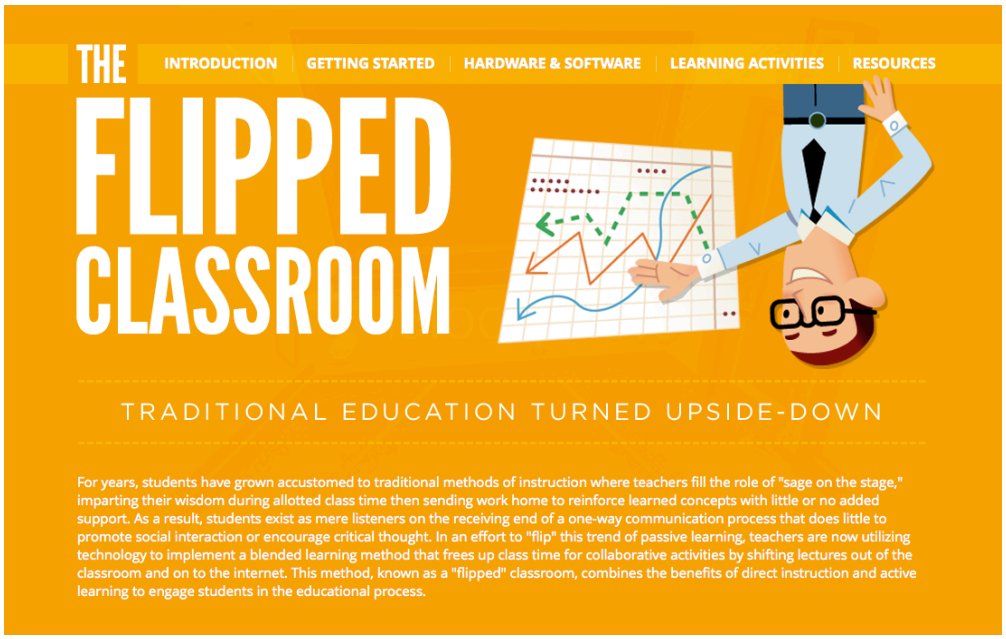

Figure 1. Screenshot of the instructional module

The module was arranged in a progressive, rolling layout that moved step by step through the implementation process. To accommodate the varying technical skills of the participants, multiple options for the creation and delivery of video were offered. In addition, three different learning strategies were presented for participants to identify the most suitable approach for their course. The instructional strategies covered in the

module were the ARCS model of motivation, problem based learning method and collaborative learning approach.

The instructional module can be found at http://www.kokuamai.com/test/flipped.

Technologies

The instructional module was delivered through an HTML-based web page utilizing CSS and Javascript. Videos were displayed through an embedded YouTube player dispersed throughout the module. Screencast-o-matic and Screenr were used to capture and deliver all screencast tutorials. Survey questions were created and responses collected using Google Forms.

Population

Participants were teachers in grades 7 through 12 at a private, college preparatory institution in Honolulu. All were college educated and had a minimum of five years teaching experience. No limitations were placed on age, gender or technical skill, though all were proficient using the internet for general web browsing and to access email.

Courses taught by the participants varied. Students in these courses were comfortable using the internet and had regular access to a computer with broadband connectivity outside of the classroom.

Data Collection

In lieu of traditional pre- and post-tests, a retrospective survey was used to determine the effectiveness of the instructional module. This type of survey, which requests both retrospective and current assessments of the instruction after completing the module, allows participants to maintain a consistent frame of reference when responding and limits the number of incomplete responses that can occur with pre- and post-tests (Raidl, Johnson, Gardiner, Denhem, Spain, Lanting, Jayo, Liddil, & Barron, 2004).

Quantitative assessments were conducted using Likert scales to measure the effect of the module on the technical proficiency of the participants as well as to gauge their understanding of the conceptual and pedagogical processes. Open-ended surveys provided qualitative data to determine the module's impact on the feelings and attitudes of the participants toward implementing the learned method.

Demographic data was limited to the number of years teaching, grades taught and subjects taught. No additional personal information was collected.

Results

Of the ten participants, nine indicated an improved knowledge of flipped classrooms upon completion of the module (Figure 2). Average improvement was 1.6 points on a

five point Likert scale. Scale options ranged from 1 -"No Knowledge" to 5 -"Highly Knowledgeable."

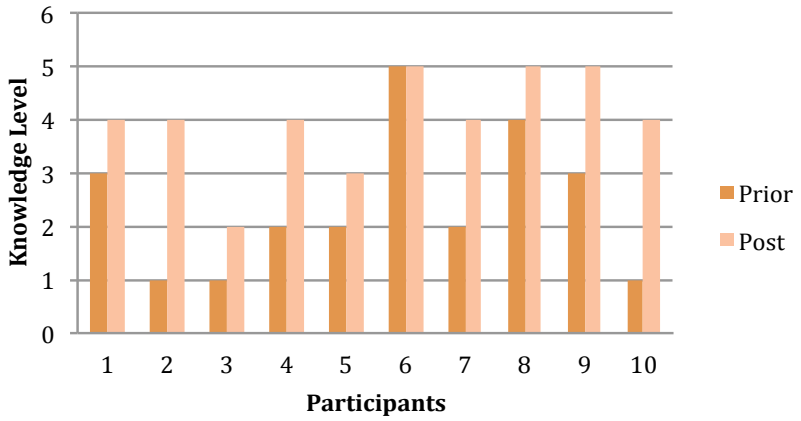

Figure 2. Difference in knowledge level upon completion of the module

Knowledge of the hardware and software needed to implement a flipped classroom improved for all ten participants. Confidence in using these same items also improved for eight of the ten participants. For the remaining participants, confidence levels were left unchanged. On average, there was a general increase in both in knowledge of and confidence in using the hardware and software introduced (Figure 3).

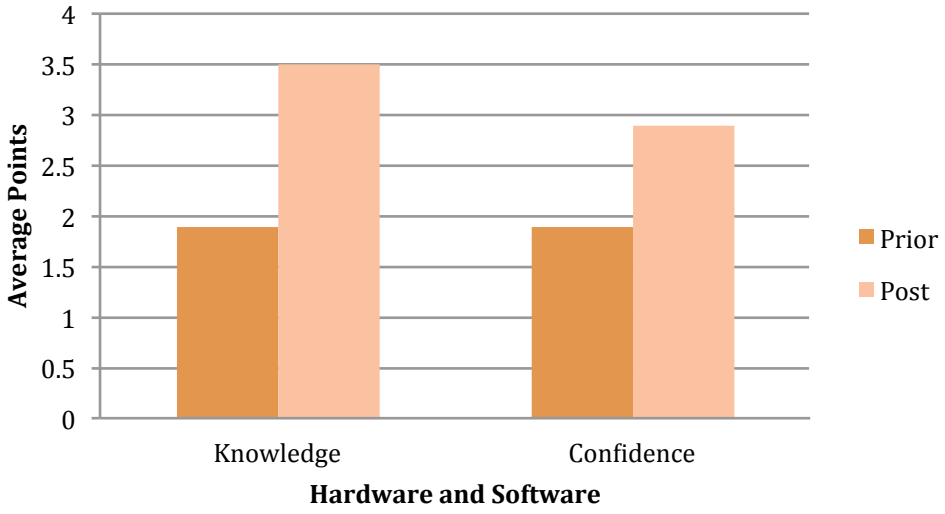

Figure 3. Change in knowledge of and confidence in using the hardware and software to implement a flipped classroom

Assessments of the learning strategies showed the greatest amount of improvement overall, particularly for the ARCS model of motivation. Participants, on average, showed a gain of 1.9 points in their knowledge of the model after completing the instruction. This compares to more modest gains of 1.2 points for problem based learning (PBL) and 0.6 points for collaborative learning (Figure 4). Nine of ten participants indicated confidence levels of moderate or greater for each of the three strategies.

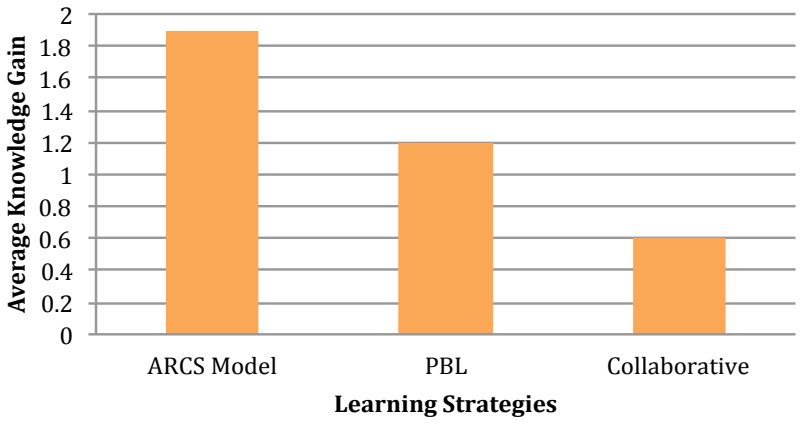

Figure 4. Average knowledge gain for learning strategies

Responses measuring the overall effectiveness of the instructional module showed an average rating of 4.5 points on a five point Likert scale, indicating a high level of success with this audience.

Open-ended responses to questions regarding the most and least helpful sections of the module varied. One participant expressed pleasure over the thoroughness of the topics covered while others specifically identified areas of the instruction that related to their level of technical interest, course and teaching style. In identifying ways in which the module could be improved, two of the four participants who responded requested examples and/or demonstrations of actual implementations in fields relating to their field of study.

The lack of examples and hands-on experience were also cited as lingering concerns for those wanting to move forward with implementation. One participant was concerned about the time required to generate a lesson and noted worries about the learning curve working with new tools. Others indicated a cautious optimism – aware that unforeseen issues would arise, yet eager to move forward with the process.

As a means to help address those unexpected issues, requests for additional support services and/or resources were also made. One participant expressed the need for one-to-one instruction as a means to reduce initial fears of working with new technology. Another asked where he/she could go to have questions answered regarding specific, field-related implementations.

Responses to questions regarding the appropriateness of a flipped implementation for different courses indicated that those who taught conventional subjects such as English, history and math were more likely to move forward with a flip. Others in nonconventional fields such as music and art expressed hesitation due to their inability to identify ways in which they could best adapt the method to their lessons.

Following along with the high effectiveness ratings of the module, nearly all participants intended to implement a flipped classroom in their courses. Of those, most shied away from instituting the method as a full instructional approach, but were eager to get started with implementation on a small scale with the intent of progressing to a larger scale as they became more familiar with the process.

Discussion

Responses indicated that the instructional module was useful for a majority of the participants. The decision to offer a broad scope of content allowed the varied participant pool to identify select areas of interest to fill their respective deficiencies. For those with little or no knowledge of flipped classrooms, the information within the module allowed them to build a strong overview of the model and provided enough of an introduction to get started with implementation.

For some, the information was a little too broad. Requests for additional specificity by both beginners and advanced users indicated that the inclusion of additional resources was necessary to address their varying deficiencies. Though it would take time to identify and present the added information, the web-based platform utilized for this module could easily accommodate more content.

Though examples were included in the module, an increase in the number of real life implementations presented would have helped to raise the confidence levels of participants intending to implement the method in their courses. Seeing working examples of the model in action would likely have provided answers to questions unaddressed by the module and reduced the level uncertainty with the process.

To address the concerns of participants teaching less conventional subjects, ideas could have been proposed or relevant examples found to address their needs. Providing even the most basic example of a potential lesson would show these participants that the flipped classroom model is suited for all types of courses.

Support beyond the module also needs to be considered. Though some participants expressed gratitude for the thoroughness of the instruction, there was still a bit of lingering hesitation as they moved into implementation. The establishment of a learning community, either online or in-person, would help beginners work through the early stages and provide guidance for more advanced users looking to expand on their initial implementations. Knowing that support is available would help to reduce the fear of uncertainty and give users the confidence to move forward on their own.

Conclusion

Flipped classrooms have the opportunity to cause a significant shift in the way instruction is delivered. Using technology, teachers are now able to provide an alternative to traditional lecture-based models by implementing a blended learning method that combines the benefits of direct instruction and active learning to engage students in the learning process

The method itself, while not difficult to initiate, requires a set of technical skills, conceptual knowledge and pedagogical expertise to implement effectively. Delivering those skills through a single module is best accomplished through a broad approach that provides users with an overview of the method and gives them the proper skills and expertise to get started.

To enhance their knowledge, participants must be exposed to working examples within their area of instruction to build confidence in their ability to implement the method on their own. Access to support communities should also be made available to provide guidance and expand on the learned experiences shared by their peers.

References

Brown, J. S., Collins, A., & Duguid, P. (1989). Situated Cognition and the Culture of Learning. Educational Researcher, 18, 32-42.

Herder, P., Subrahmanian, E., Talukdar, S., Turk, A., & Westerberg, A. (2002). The use of video-taped lectures and web-based communications in teaching: a distance-teaching and cross-Atlantic collaboration experiment. European Journal of Engineering Education, 27(1), 39-48.

Keller, J. M. (1987). Development and use of the ARCS model of motivational design. Journal of Instructional Development, 10(3), 2 – 10.

King, A. (1993). From sage on the stage to guide on the side. College Teaching, 41(1), 30.

Petress, K. (2008). What Is Meant by "Active Learning?". Education, 128(4), 566-569.

Raidl, M., Johnson, S., Gardiner, K., Denhem, M., Spain, K., Lanting, R., Jayo, C., Liddil, A., & Barron, K. (2004) Use Retrospective Surveys to Obtain Complete Data Sets and Measure Impact in Extension Programs. Journal of Extension, 42(2). Retrieved from http://www.joe.org/joe/2004april/rb2.php

Rhodes, L. K., & Bellamy, T. (1999). Choices and consequences in the reform of teacher education. Journal of Teacher Education, 50, 17-26.

Salter, D., Pang, M. C., & Sharma, P. (2009). Active Tasks to Change the Use of Class Time within an Outcomes Based Approach to Curriculum Design. Journal of University Teaching and Learning Practice, 6(1), 27-38.

Sezer, R. (2010). Pulling out All the Stops. Education, 130(3), 416-423.

Tucker, B. (2012) The Flipped Classroom. Education Next, 12 (1). Retrieved from http://educationnext.org/the-flipped-classroom/

Wenger, E. (1999). Communities of Practice: Learning, Meaning, and Identity. Cambridge University Press.