The Flipped Classroom Instructional Module

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Abstract: The creation of electronic instructional materials has suggested that learning is no longer restricted to the confines of a traditional classroom. In the Flipped Classroom Model, instruction occurs at home while class time is used to work on applying the material with assistance from the instructor. While forms of this model have been used for decades, new technologies have made this method of instruction increasingly popular. This paper discusses the implementation of a flipped teaching instructional module created using Google Sites. The module was originally created for St. Andrew's Priory middle school teachers, but quickly spread to participants across North America. Learners went through a series of chapters preparing them to create flipped teaching lesson plans of their own. Data was collected online through Google Forms. Participants found the content to be easy to follow and enjoyed the use of examples from a variety of subjects. When asked if they would implement the model in their classroom more than half of the participants stated they would. Some participants also commented on how they would share the information they learned with their coworkers and school administration. Suggestions for improvement will be noted and the module will be edited for future use.

Introduction

The traditional classroom dedicates class time for the delivery of content through the use of lectures. The material goes out of the instructor's mouth, into the ears of the student. Once class is over, students return home to apply the new material to a set of problems or activities. This commonly used method of instruction is often criticized, yet many teachers find it difficult to avoid (Foertsch et al., 2002). In the Flipped Classroom Model, classwork and homework are reversed. Students spend time at home reviewing interactive lectures, reading articles and exploring the material while class time is used for students and teachers to work on exercises together. Through the use of technology and the resources available today, the Flipped Classroom Model is quickly growing in popularity as a preferred form of instruction.

The purpose of this paper is to discuss the implementation of an instructional design module created using Google Sites to assist St. Andrew's Priory middle school teachers in creating flipped classroom lesson plans. Teachers learned to create their own

interactive lectures and plan effective classroom activities to apply the Flipped Classroom Model to their own classrooms.

Background

The Flipped Classroom Model is not an entirely new concept. It is believed that English teachers were the first to use this model, asking students complete assigned readings at home in preparation for class discussions. However, in 2004 Aaron Sams and John Bergmann defined the model to extend to other subjects. Sams and Bergmann, two science teachers from Colorado, began distributing take-home instructional materials to students who were absent due to illness or extra curricular activities. Students were sent home with screencasts and previously recorded lectures to catch up on the material they missed. The two quickly realized how efficient the method was for delivering instruction and decided to extend flipped lectures to the entire class. They were able to spend less class time lecturing and more time working on experiments while interacting with their students (Bergmann & Sams, 2011). Thus, they created the Flipped Classroom Model.

Ojalvo (2012) described the flipped classroom as an inverted classroom that aims to fix the traditional lecture model of instruction. He claimed that since the delivery of the material is done outside of the classroom, students can use class time to absorb the material through problem solving and skill development. In a flipped classroom, teachers serve as a guides to students as they work together with their peers. Those who have attempted to flip their classrooms have used the extra class time to give valuable one-on-one assistance to students (Rycik, 2012).

Flipped lectures can be created in a variety of ways: through teacher created instructional materials uploaded onto the web, through audio recordings or by finding resources already released online (Ojalvo, 2012). While creating flipped classroom lectures can be time consuming, teachers stress that the instructional materials are not the key to flipped teaching (Tucker, 2012). In fact, it is what teachers do in the classroom that enhances students' learning experiences. Since teachers spend less time lecturing, they become less like a presenter and more like a "learning coach" (Bergmann & Sams, 2011).

Over the past few years, the flipped classroom has become more and more popular in K-12 schools. Teachers from all over the United States are hearing about this model and adapting it to fit their classrooms. Many teachers are also seeking flipped classroom training to effectively use this method of instruction (Lambert, 2013).

Methodology

Instructional Strategies

The intended goal of The Flipped Classroom Module was not only to show teachers how to create flipped teaching lesson plans, but to also persuade them to use the model in their own classroom. Therefore, Keller's ARCS Model of Motivational Learning was used to design an instructional module that would focus on the application and theory behind the

model. The ARCS model was selected to help target the motivational characteristics of the learner to increase the module's effectiveness. The ARCS model is comprised of four factors to sustain motivation: attention, relevance, confidence and satisfaction (Keller, 1999). All four factors were used in creating this module (Table 1).

Gagne's Nine Events of Instruction were also used in the constructing the module. The nine events include: gain attention, inform learners of objectives, stimulate recall, present material, provide guidance, elicit performance, provide feedback, promote retention and enhance retention ("Gagne's nine," 2013). These events can be manipulated to fit the learner's needs (Gagne & Rohwer, 1969). Therefore, not all events were used (Table 1). Once the appropriate instructional strategies were selected for the module's intended outcome, the content was broken into six chapters based on Gagne's theory of chunking (Gagne & Rohwer, 1969). Then, elements from both instructional strategies were applied to each chapter (Table 1).

Prior to implementing the module, a one-to-one meeting was to review drafts of the module and to provide constructive criticism (Carey & Dick, 1985). The subject used in this meeting provided advice on word choice, use of examples, page layout and structure and expectations of the learner.

Table 1. Instructional design theories implemented.

Section of Module	Instructional Design Strategy
Chapter Structure	The module's chapters or "chunks" were designed to avoid information overload (Gagne & Rohwer, 1969). Each chapter uses a variety of text, video and images to maintain attention (Keller, 2000).
Chapter 1-3	Chapters 1 through 3 are focused on capturing the participant's attention to increase likeliness in completing the module (Gagne & Rohwer, 1969; Keller, 1999). Learners are continually reminded of their final objective in preparation for later chapters (Gagne & Rohwer, 1969).
Chapter 4	Chapter 4 aims to highlight the relevance of the module to the learner. In doing so, motivation is maintained by creating a connection to the material (Keller, 1999).
Chapter 5	The main goal of chapter 5 was to increase the learner's confidence in completing the final task through the analysis of detailed examples (Keller, 1999). Examples helped provide guidance and used knowledge from previous chapters, stimulating recall and creating a scaffolding effect by allowing learners to build on previous information (Gagne & Rohwer, 1969).
Chapter 6	The Flipped Classroom Planning Worksheet used in chapter 6 serves as an opportunity to apply the module, ultimately evoking intrinsic satisfaction (Keller, 2000). Positive reinforcement was used at the end of the module to acknowledge the participants work. This too aimed to increase satisfaction in the learner (Keller, 1999).
Embedded Questions	To ensure that participants are given the opportunity to practice the new material, embedded surveys were included at the end of each chapter. Once responses were submitted, correct answers were posted as an automated reply. This helped to provide feedback and encourage learners to continue with the module (Gagne & Rohwer, 1969).

Technologies

To accommodate the busy schedules of participants, the module was delivered entirely online. A Google Site was created containing the module itself as well as the necessary surveys. The site contained a combination of text, images, videos, external links, and embedded test questions to measure the learning progress of participants. Tests and surveys were created using Google Survey tools. Results were then published to a Google Form for analysis.

Subjects

The Flipped Classroom Instructional Module was originally created for middle school teachers from St. Andrew's Priory school. However due to scheduling conflicts, the module was opened to participants across North America to reach a sufficient number of subjects. Participants were invited through email and social media. Eighteen participants with varied teaching experience and subject areas were used in this study. However, only fifteen successfully completed all series of surveys. The responses from the three participants who did not complete the module were omitted from any data analysis.

Data Collection

Qualitative and quantitative data were collected through a series of surveys. Participants were asked to complete a Demographic Survey prior to the start of the module. Likert scale, multiple choice and open-ended questions were used to determine the participants' previous experience and understanding of flipped teaching. Following each chapter in the module was a short survey of embedded questions with multiple choice and open-ended questions. Half of the embedded survey questions were based on the content of the chapter, while the other half were used to persuade learners to apply the material to their own classrooms. Lastly, a Summative Survey was given upon completion of the module. This survey used Likert scale and open-ended questions to measure how participants felt about the module.

At the start of the module, each participant was asked to create a learner ID based on their initials and the last 4 digits of their telephone number. The ID was required at the start of each survey to ensure that responses were matched to their respective participant.

Results

Demographic Survey

The Demographic Survey was used to determine the background information of the participants as well as determine their level of understanding of the Flipped Classroom Model prior to reading the module. The survey showed the majority of participants were females under the age of 30. The data also showed that the majority of current teachers who participated in the study have been teaching for less than five years (Table 2).

Table 2. Demographics of participants.

Attribute	Percentage Breakdown
Male/Female	Male: 20% Female: 80%
Age (in years)	0-17: 0% 18-29: 73.3% 30-44: 13.3% 45-59: 13.3%
Highest Degree Received	High School Diploma: 6.7% Bachelor's Degree: 73.3% Master's Degree: 20% Doctoral Degree: 0%
Currently Teaching	Yes: 66.6% No: 33.3%
Grade Specialization	K-5: 46.7% 6-8: 33.3% 9-12: 26.7% Post-Secondary: 0%
Teaching Experience (in years)	0-5: 46.7% 6-10: 13.3% 11-20: 6.7% 20+: 0%

The Demographic Survey also examined the participants' familiarity with flipped teaching. The average scores for four-point Likert scale questions were calculated. Most frequent responses were also examined. Results suggested that while the majority of participants claimed to be familiar with the Flipped Classroom Model, many have not had a significant training nor do they apply the model to their classrooms (Table 3). This arguably suggests that the module was warranted and contained new information to the participants.

Table 3. Previous flipped classroom experience.

Question	Average Score (Out of 4)	Most Frequent Response (Out of 4)
I am familiar with the Flipped Classroom Model.	2.8	3 Agree
I have had training on flipped teaching.	1.8	2 Disagree
I use the Flipped Classroom Model in my courses.	1.8	2 Disagree

Note. Values represented on four-point Likert scale.

Embedded test questions

Following each chapter was a small set of embedded questions. Eight of the sixteen questions were based on content explicitly stated within the chapters. These questions were marked as either correct or incorrect. Final scores were calculated for each participant. Eight out of fifteen participants scored a 100% on content-based questions, five scored an 87.5%, and one participant received a 62.5% (Figure 1). The average score for the population as a whole is 91.7%.

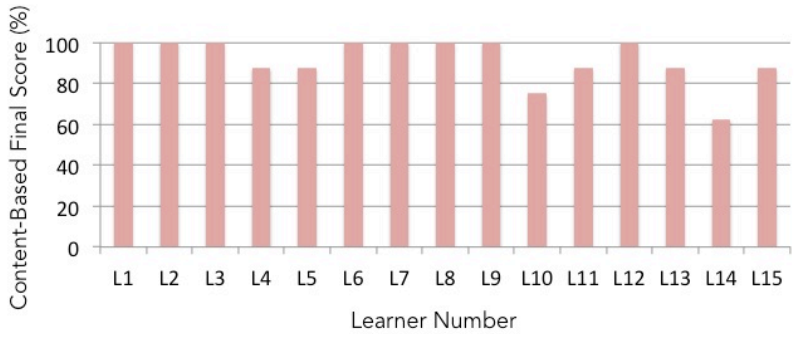

Figure 1. Content-based final scores of participants.

The next six embedded test questions were used to help participants make connections between the module's content and their own teaching styles (Table 4). The questions were not marked, as their sole purpose was to help improve the learning process. Examination of responses showed 80% of participants used concrete examples to make connections between the material and the learner's teaching environment. Therefore showing an understanding of the material.

Table 4. Questions used for reflection.

Question Number	Reflection Question
1.4	What do you find the most appealing about flipped teaching and why?
2.4	Which form of instructional materials would best fit with your classroom and why?
3.3	Which of the mentioned classroom activities are you most interested in trying in your classroom and why?
4.1	What do you feel are the benefits of the flipped classroom model?
4.2	How can the flipped classroom positively affect your classroom?
4.3	Do you feel the flipped classroom model could be successful in your school? Think about your students, administration and the resources available to you.

The final two embedded questions were used to measure the participant's ability to apply the module's concepts. The first gave participants a real life situation where they asked to select appropriate instructional materials and classroom activities. 73% of the participants produced satisfactory answers that showed effective use of the model. The remaining 27% failed to follow directions and omitted the question.

The final embedded question asked participants to fill out a Flipped Classroom Planning Worksheet to create their own flipped lesson plan in chapter 6. This was the only embedded question that was not created through Google Survey tools. Participants were asked to download a form, fill it the blanks, then upload it back to the website. Only seven out of the fifteen participants were able to successfully upload in their final worksheets. Many reported technical issues with downloading and/or uploading from a PC computer. While all seven worksheets used the Flipped Teaching Model correctly, this question cannot be accurately analyzed.

Summative Survey

A Summative Survey was used to evaluate participants' response to module. The first seven questions used the Likert scale to analyze the arrangement of content within the module. Responses were averaged on a scale of 1 to 4 (Table 5). All of the average scores produced either "Agree" or "Strongly Agree." Results showed that the most frequent response for each question was "Strongly Agree." The lowest average score for this set of questions evaluated the module's length.

Table 5. Responses to module's structure.

Summative Survey Question	Average Score (Out of 4)
The lessons were easy to follow.	3.3
The chapters were well divided.	3.6
The examples were helpful.	3.7
The practice questions in the module helped in reviewing the content.	3.6
The length of the module was reasonable.	3.4
The information provided in the module was enough to answer the test questions.	3.6
My level of understanding of the flipped classroom has increased from this module.	3.6

Note. Values represented on 4-point Likert scale.

The next question in the summative survey asked participants if they would attempt the Flipped Classroom Model in their classroom and why. To analyze this question, qualitative coding was used. Reponses that showed interest in using the Flipped Classroom Model were classified as "acceptance," while responses that indicated a lack of interest were classified as "refusal." The remaining responses that were circumstantial and did not suggest either acceptance or rejection were classified as "neutral." Results showed that 80% of participants would use the model in their classrooms, 7% refused the model and 13% were neutral.

Similarly, when asked if participants felt prepared to use the model in their classrooms, responses were coded. Responses that showed participants felt ready to use the model were classified as "prepared." Those that suggested participants required more research were coded as "unprepared." Remaining responses that did not indicate either selection were classified as "neutral". The study showed that 80% felt prepared, 13% felt unprepared and 7% were neutral. The final questions asked participants for suggestions for improvement. Responses will be discussed in later sections.

Implications or Discussion

The Demographic Survey revealed that 12 out of 15 participants claimed they were familiar with the Flipped Classroom Model, yet 13 participants admitted to not having any training. This justified the presence of an instructional module to provide training on implementing this method of instruction. The survey also indicated that the majority of subjects were under the age of 30. It can be assumed that many were therefore digital

natives. This strengthened the assumption that the intended subject group for this module did not require basic technical training. Therefore the module's focus on the application of the Flipped Classroom Model rather than a "how-to" guide on creating instructional materials was appropriate.

The data collected in the content-based embedded questions suggested favorable outcomes. The population's average score was a 91.7%. This elevated average indicated that information presented in the module was clear to participants. Summative Survey responses suggested that participants enjoyed the availability of the embedded questions and felt they helped with retention of the material.

It is important to discuss that technical difficulties occurred in chapter 6. Only seven out of fifteen participants were able to successfully upload the Flipped Classroom Planning Worksheet. Even though all seven worksheets were correctly completed, it was unclear as to whether the remaining participants possessed the necessary skills to complete the task. However, when given a real-life situation in chapter 5, 73% of the participants produced satisfactory responses. Thus, had participants ben able to upload their worksheets, data would have likely indicated that more participants were able to produce a flipped classroom lesson plan. In future research, new technologies should be explored to avoid similar technical issues.

Open-ended questions in the Summative Survey examined participants' responses to the module. Many stated that the module was easy to follow and made good use of examples within the text. One user stated that, "lessons were chunked well." However, some argued that certain chapters were text heavy and that the module's length was slightly unreasonable. Another participant suggested including videos that showed teachers using the model with their students. These factors should be considered for modifying the modules or conducting future studies.

When asked if participants would use the Flipped Classroom Model in their classroom, 12 out of 15 participants claimed that they would. It is important to note that this question highlighted the essential goal of the module. By stating that they would in fact use the model and felt prepared to do so, the module appeared to be effective in persuading teachers to adopt this method of instruction.

Conclusion

With the creation of new technologies, comes the search for more effective and efficient teaching strategies. Instructional materials are no longer restricted to textbooks and lecture notes. Teachers have hundreds of online resources to facilitate teaching and learning, while students have access to unlimited information through the Internet. The Flipped Classroom Model uses these resources to enhance students' learning experiences. Instruction occurs at home to allow the exploration of more challenging and enriching material during class. The participants of this study were given the necessary tools to apply this model to their classrooms and hopefully benefit the lives of many students to come.

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