IDE 632 Final Exam

Product Design Specifications

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Introduction:
This project is intended to assist the department chair "client" of the Environmental Engineering Department in successfully implementing the flipped classroom model within the current established master's program. Although the initial plan is to only use the flipped classroom model in four of the ten courses, the client eventually would like to expand this model for the other courses as well. The client has some knowledge of the flipped classroom model as he has heard people discuss this model and has read a few articles but is unsure how to implement this model. The instructional system development (ISD) model our team will use throughout this project is the ASSURE model that will assist the team in recommending best strategies and methods for the client.

Client and Audience:
The department chair of the Environmental Engineering Department of said university contacted us on April 23, 2020 with the interest of converting a few of his courses to the flipped classroom model. His initial understanding of the flipped classroom is limited, and his exposure is only through a few articles and casual conversation. Currently he oversees four courses that support a 30-credit master's program and is instructed by a total of seven faculty members consisting of four full time instructors and three adjunct professors. Although the more senior core professors are a little skeptical and hesitant to convert their courses to the flipped classroom model, they are open to exploring its possibilities. The three adjunct professors are more receptive to the conversion and fully support the department chairs vision for transformation.

The four courses of focus are the following: Environmental Engineering Analysis Tools, Environmental Engineering Unit Processes Lab I, Applied Instrumentation and Control, and Design of Solid Waste Treatment Systems. In order to remain in compliance with current course accreditation and the higher learning committee, we will not make any adjustments to the current courseware or objectives. To accomplish this, we will work closely in partnership with the department chair and his staff. The purpose of converting to the flipped classroom model is to meet the intent of the department chair's vision of increased student learning, apply real application of concepts, and create a more conducive environment for deeper understanding for the students.

Project Goals and Objectives:
Our goals and objectives for this conversion is to assist the Department of Engineering in their efforts to convert their programmed courses from the traditional instruction of learning to the flipped classroom model. We will accomplish these goals and objectives in three phases and apply the ASSURE model as our foundational platform for transformation. Each phase is aligned with a specified objective, milestones, and timelines that are mutually supporting and are anchored to faculty development and course integration. We will focus efforts on the successful conversion of two classrooms for the spring 2021 semester with the remainder of integration to come in the fall of 2021. Each phase of the operation uses two components of the ASSURE model to guide transformation, educate the professors, establish new classroom management plans, facilitate technology integration, and implement and evaluate the flipped classroom model. Finally, we will ensure there is no change to

the course mandated objectives and regional accreditations that can derail or slow progress for complete transformation.

Project/Product

This project is structured in three distinct phases. Each phase contains products associated with project success.

Phase 1: The key products of this phase are the Flipped Classroom Introduction Presentation and the Flipped Classroom Resource Page This presentation will take place at the university on May 4, 2020. The presentation will include the university objectives, provide a wealth of information and resources to assist in the understanding and implementation of the flipped classroom model. The interviews conducted in this phase are critical to the development of the products in Phase 2.

Phase 2: The key products in this phase are the Flipped Training Tutorials and workshop. The Flipped Training Tutorials will be developed by the professors of the four classes scheduled to be flipped following the interview process and guidance from the ID team. All professors will participate in the Blackboard training tutorials 5 – 10 August 2020 as part of the Bloom's Taxonomy remembering and understanding portion of the flipped classroom model. The workshop will take place on 11 August 2020. The workshop will cover the material of all four separate tutorials in the classroom portion of the flipped classroom model and the after-class evaluation overview.

Phase 3: The key products in this stage are the Flipped Classroom Observational Checklist and the Flipped Classroom Evaluation Surveys (Teacher & Student). These products provide a means for providing evaluation throughout the Flipped Classroom Project. More information for these products is provided below in the Product Specifications section.

Means

To successfully implement flipped classroom courses for the university, the ID team will use the ASSURE Model. In addition to the structure of the ID Model, the ID team will keep the current course objectives, and utilize existing university resources such as the university's Center for Online Digital Learning and online platforms such as Blackboard, Zoom, and Camtasia. The Consolidated Flipped Classroom Resource Page provided at the orientation briefing will provide a continuous source of reference and point of contact list to aid the professors during and after their transition to the flipped classroom model.

Project Plan Details

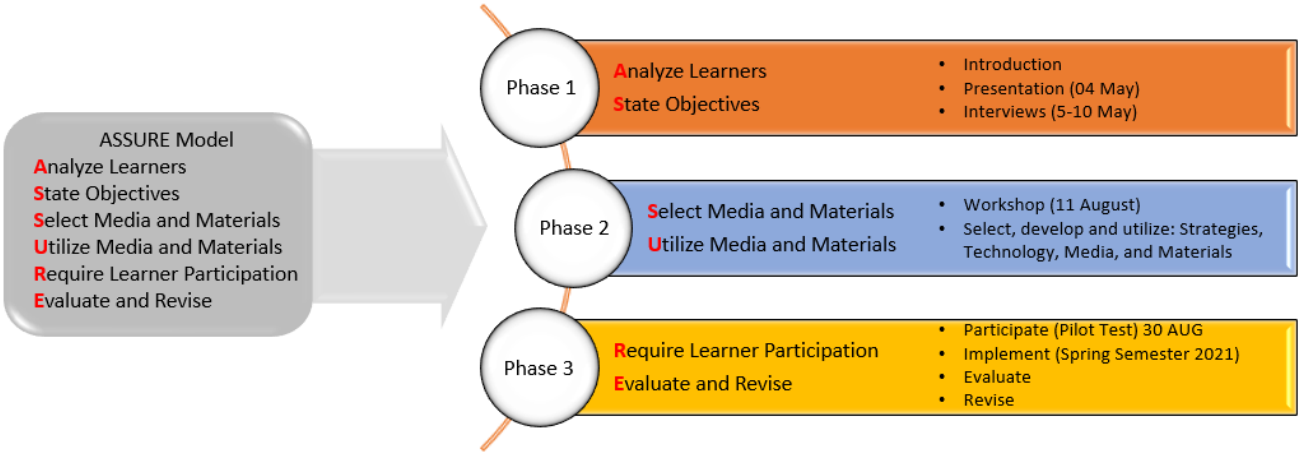
Below are the recommended critical tasks that need to be completed using a widely used ISD model which is broken down into phases. Although the ID team believes this is the best model and timeline to use for executing the flipped classroom approach, we are also prepared to make changes depending on the guidance and input from the client.

Project Tasks

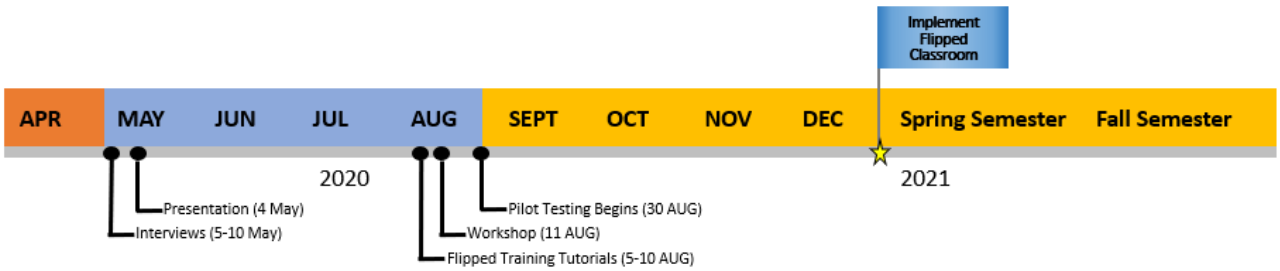
The ISD model our team selected to use for implementing the flipped classroom approach for the 2021 Spring semester is the ASSURE Model. This model was developed by Robert Heinich and Michael Molenda, which is intended to assist in designing and developing optimal learning environments for students to improve teaching and learning. The ASSURE Model is broken down into six separate components, which are listed and explained in the table below.

ASSURE Model	
Analyze Learners	Includes analyzing learners' abilities, characteristics, attributes, competencies, and learning styles.
State Objectives	Includes ensuring the desired outcome is clearly stated and defined to eliminate confusion. This should be completed for each lesson/video.
Select Media and Materials	Includes selecting the appropriate instructional strategies/methods, technology, materials and media to deliver the instructions.
Utilize Media and Materials	Includes developing a plan in using the instructional strategies/methods, technology, materials and media that were selected, ensuring they align with the goals and objectives.
Require Learner Participation	Includes creating and establishing methods on how to include students within the instructions (class discussions).
Evaluate and Revise	Includes evaluating everything that was selected and created. This should include feedback from the teachers and the students. Then revise as needed to improve.

The ID team will use the six components of the ASSURE model and divide them into three phases as illustrated in the figure below.



Although our team will use a well-known and widely used ISD model, establishing a timeline with critical milestones is important to ensure all the faculty members are prepared and ready to implement the flipped classroom model on time and within budget. Our team has developed and recommended a timeline that will assist in ensuring every milestone is completed. The timeline shown below only represents the critical milestones within the recommended plan.



Resources
The goal of this project is to incorporate resources that are already available at the university. A list of itemized resources is grouped according to the groups of stakeholders.

Professor:

- Internet access.
- Computer.
- Access to a qualified POC at the Center for Online Digital Learning.
- Access to Camtasia (with job aids, reference materials) or another like platform.
- Access to Blackboard (with job aids, reference materials).
- Access and training in digital workspaces (e.g. Google Docs, etc.).
- Access to Flipped Classroom applications, activities, and or resources).

ID Team:

- University access.
- Internet access.
- Appropriate Classroom/Workspace for the orientation and workshop.
- Access to the university Blackboard courses.
- Printer/Copier Access.

Students:

- Internet Access
- Computer
- Access to Blackboard
- Access to course required programs.

Product Specifications

Phase 1: The Flipped Classroom Introduction Video will focus on the three proposed Flipped Classroom university objectives, the four pillars of a Flipped Classroom, and provide a consolidated Flipped Classroom Resource Page with university points of contact. The proposed university Flipped Classroom objectives are (Clark et al., 2016, p. 3):

1. Enhance in-depth learning and achievement of higher-order skills in Bloom's taxonomy.
2. Enhance student engagement in learning,
3. Better utilize the school's state-of-the-art instructional facilities and technology to support active learning.

The four pillars of a Flipped Classroom are (Michigan State University, n.d., p. 2/7):

1. Flexible Environment
2. Learning Culture
3. Intentional Content
4. Professional Educator

The Flipped Classroom Resource Page will include phone numbers for key staff at the Center for Online Digital Learning, how to videos, classroom resources, best practices, and more. Possible links might include https://www.youtube.com/watch?v=JP_C-PFX2nw&feature=youtu.be, https://www.youtube.com/watch?v=BCIxikOq73Q, https://omerad.msu.edu/teaching/teaching-strategies/27-teaching/162-what-why-and-how-to-implement-a-flipped-classroom-model , and https://www.commonsense.org/education/top-picks/best-apps-and-websites-for-the-flipped-classroom .

Phase 2:
The Flipped Training Tutorials will be developed by the professors of the four classes scheduled to be flipped following the interview process and guidance from the ID team. During the interview process, the interviewer will identify a key problem or area in the professor's course that could be improved with the Flipped Classroom Model (e.g. 75 – 80 % of classroom time is focused on how to be a puckster versus applying or analyzing the knowledge). The creation of the training tutorials will help the professors learn how to create a product similar to those that they will create for their Flipped Classroom. This training tutorial should help all teachers by providing a practical application of the flipped classroom model that they can each relate to. This will hopefully improve the diffusion process and greatly increase professor buy-in for the flipped classroom model.

The workshop will be divided into five sections. The section will include one classroom exercises/activity per Flipped Training Tutorial, and a generic evaluation portion in order to discuss the third after class portion of the flipped classroom model. The classroom portion of the Flipped Classroom Model should help the professors achieve the Bloom's Taxonomy levels of applying and analyzing. The after-class portion of the flipped classroom model will help learners achieve Bloom's Taxonomy level of evaluating and creating as an evaluation exercise during the workshop but will also be explained as an after-class reinforcement process for future classes.

Phase 3:
The Flipped Classroom Observational Checklist provides a structured format for classroom observation as part of the evaluation process in the next section. The Flipped Classroom Evaluation Surveys provide a method for collecting feedback on the implementation, design, and execution of the flipped classroom model. Surveys will gage student and professor perceptions of exams, assignments, course content, instructional goals, attendance, engagement, and the level of higher-level learning attained during the course. The evaluation process is key in the refinement of the initial flipped classroom courses, the implementation of the second group of flipped classroom courses, future flipped classroom courses, and providing a means for continuous evaluation and refinement.

Evaluation
Evaluation will be both summative and formative. All evaluation measures will be focused on the proposed university Flipped Classroom objectives (Clark et al., 2016, p. 3):

1. Enhance in-depth learning and achievement of higher-order skills in Bloom's taxonomy.
2. Enhance student engagement in learning,

3. Better utilize the school's state-of-the-art instructional facilities and technology to support active learning.

The Formative measures will include classroom observation, attendance, exams, and assignments. Summative measures will include both professor and student perception surveys.

Reflection

Limitations/Constraints
Implementing the flipped classroom model for the four courses in the Environmental Engineering Department can have some limitations/constraints, which are listed below.

1. It can be challenging to select the topic/key area to focus on for the flipped classroom approach. This can be subjective and very from each individual.

2. The level of technology varies from each member of the faculty, this can hinder the speed of the developed training/workshop.

3. Although our team has focused on getting every member of the faculty to "buy in" on the flipped classroom model, the lack of incentives can have a negative effect on implementing the flipped classroom model.

4. The given time to train and execute a workshop was limited. This can have a negative effect on some faculty members as additional training time is limited.

Additional Questions:

After collaborating with our team to complete this design brief, we would have liked to have asked the following additional questions:

1. We understand at the current moment you are interested in the flipped classroom model. In the event that this model fails to implement successfully in the Spring Semester of 2021, have you considered or thought of a contingency plan? Will you continue to pursue implementing this model for your department or will you revert back to your traditional classroom approach? How committed are you in the flipped classroom model?

2. Are there currently any incentives established for your faculty? Have you thought or is there a plan to develop incentives for implementing the flipped classroom model within your department?

References

Clark, R., Besterfield-Sacre, M., Budny, D., Bursic, K., Clark, W., Norman, B., … Parker, R. (2016). Flipping engineering courses: a school wide initiative. *Advances in Engineering Education*, 1 - 39. Retrieved from https://advances.asee.org/wp-content/uploads/vol05/issue03/Papers/AEE-19-Flipping-Clark-2.pdf

Michigan State University. (n.d.). *What, why, and how to implement a flipped classroom model.* Retrieved from https://omerad.msu.edu/teaching/teaching-strategies/27-teaching/162-what-why-and-how-to-implement-a-flipped-classroom-model