GOOD Flipped Classroom CASE

Flipped Learning and Teaching Initiative

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Instructor
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Department
Department of Electrical and Electronic Engineering (EEE)

EE2002
Circuit Analysis
EE2003
Electronics
EE3001
Analogue and Digital Circuits
EE3003
Power Electronics and Drives

Class size
90-150

Students
Year 2 and Year 3

Details of Flipped Classroom IMPLEMENTATION

Why did the instructor use the flipped classroom approach?

Rebecca recognised that the 13-week teaching schedule is insufficient to cover all the necessary content. Adopting a flipped classroom approach could be the solution, allowing students to study lecture materials before class and enabling Rebecca to allocate class time for deeper exploration and interactive learning activities. Furthermore, she believes that self-directed learning and peer discussions among students can enhance their understanding more effectively than traditional one-way didactic methods. These two factors were central to her decision to implement the flipped classroom model.

How was the flipped teaching approach implemented?

Preparation of materials

Rebecca's pre-class videos consist of a curated mix of her homemade Zoom recordings, personally filmed instructional content, and selected educational videos sourced from the internet. In her own recordings, Rebecca makes a conscious effort to speak slowly to ensure clarity and comprehension. Additionally, she has developed a comprehensive set of multiple-choice questions to assess students' understanding of the videos and their prior knowledge. Furthermore, she has prepared customised handwritten notes for her lectures, intentionally designed with blank spaces for students to jot down their ideas during class.

Pre-class activity

For certain lectures, students are required to engage with the assigned videos, which last approximately 30 to 60 minutes, and then answer multiple-choice questions provided on Blackboard. For some laboratory sessions, students complete preparatory tasks designed to enhance their preparedness for the practical experience during class. These include assignments with photos of engineering equipment to help refresh their memory on proper usage, as well as pre-lab videos that guided students through fundamental concepts. Additionally, students' engagement with the pre-class videos and their completion of the multiple-choice questions are factored into their final grade, providing an incentive for participation.

In-class activity

In the lecture, students receive customised notes with blank spaces, allowing them to collaboratively engage with the content. These activities may include tasks such as analysing waveforms for a circuit, where students are encouraged to discuss their ideas with peers to consolidate their understanding. Subsequently, some representatives are invited to present their answers by drawing them on the board. Following this, Rebecca discusses with the students to examine why their drawings may be correct or incorrect. Rebecca employed a variety of questions and facilitated engaging discussions in her flipped classroom, guiding students towards the self-discovery of their own solutions and critical thinking skills. This approach helps stimulate students' curiosity and deepens their understanding of the material.

In the laboratory session, Rebecca employs the peer tutoring method to enhance students' concentration and facilitate her instruction on various engineering equipment. Students work in groups of three, with each member learning to use different lab equipment before collaborating on laboratory tasks. Afterwards, they reconvene with their group to discuss and share the knowledge they've gained from the demonstrations. Additionally, lab report templates are designed to guide students in observing key details during the sessions.

Post-class activity

Students are required to complete assignments and lab reports that are closely related to the course content. Most of Rebecca's assignments require students to use their problem-solving skills rather than merely providing numerical answers, as she believes the process of logical thinking is far more important for developing students' critical thinking compared to the final answer itself. Several of the lab reports require students to compare experimental data with theoretical predictions, a process that develops critical analytical skills beyond simple observation.

What are the good practices that can be learnt from this case?

Boosting student engagement in pre-class activities through incentives

- To enhance student engagement in pre-class activities, Rebecca delivers key concepts in her videos to maintain students' attention. The accompanying multiple-choice questions are designed to keep students interested, assess their understanding of the content, and reinforce their retention of the material. Moreover, students' interaction with the pre-class videos and their completion of the multiple-choice questions are incorporated into their final grade, providing a strong incentive for active participation.

Using customised learning materials to better engage students

- Rebecca designed custom handwritten notes with blank spaces to encourage students to engage in a more active learning process. Instead of merely listening to the teacher, students become participants in their education. They have chances to reflect on what they have learned before and during class and fill in the blanks on their own before Rebecca provides the answers. This approach fosters creativity and deepens their understanding of the lesson. Additionally, it promotes focused, interactive, and collaborative learning during class time, as students can work together to solve problems and clarify concepts. This practice ensures that students are genuinely contemplating their learning rather than simply following a model answer.

What were the challenges encountered during the implementation and what solutions were used?

Opposite opinions from students about custom handwriting

Many students in the SFQ have acknowledged the benefits of leaving blanks in customised handwritten notes, as this approach aids concentration and enhances learning during class. However, some students have expressed a preference for Rebecca to post complete notes on the Blackboard platform. This preference stems from their inability to attend face-to-face classes due to early classes, making it challenging for them to fill in the custom notes without active participation. Despite this feedback, Rebecca has chosen not to post the notes online, believing that doing so may discourage students from attending classes, which she considers essential for a comprehensive learning experience. Over time, as students have become more aware of the rationale and advantages of customised handwritten notes, the frequency of complaints has noticeably decreased.

Challenges in enhancing in-class sharing effectiveness

Currently, students engage in group discussions and knowledge sharing in a manner similar to traditional classrooms, where they write down their ideas on paper and present them to the class. Rebecca is exploring advanced collaborative learning tools which enable students to brainstorm and share ideas visually and interactively, and that could be leveraged to enhance student learning outcomes and foster collaboration through improved group discussions and effective knowledge sharing.

What was the impact on student learning?

Pre-class videos and assignments allow students to learn at their own pace before class, freeing up in-class time for deeper exploration of topics through discussions. Additionally, personalised handwritten notes and Rebecca's interactive questioning techniques reinforce key concepts learned during pre-class activities and encourage critical thinking. This approach not only makes the learning experience more engaging and effective but also enhances students' concentration and focus on their studies.