

Re-designing PETE 353: The Petroleum Project Evaluation Course

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Aim of Project

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START

The aim of re-designing the Petroleum Engineering course (PETE 353), is to find a way to enhance students' learning experience, motivation and engagement. This course is known to be a difficult course for students, thus finding a new way to teach it could also make it more enjoyable and engaging.

The re-design

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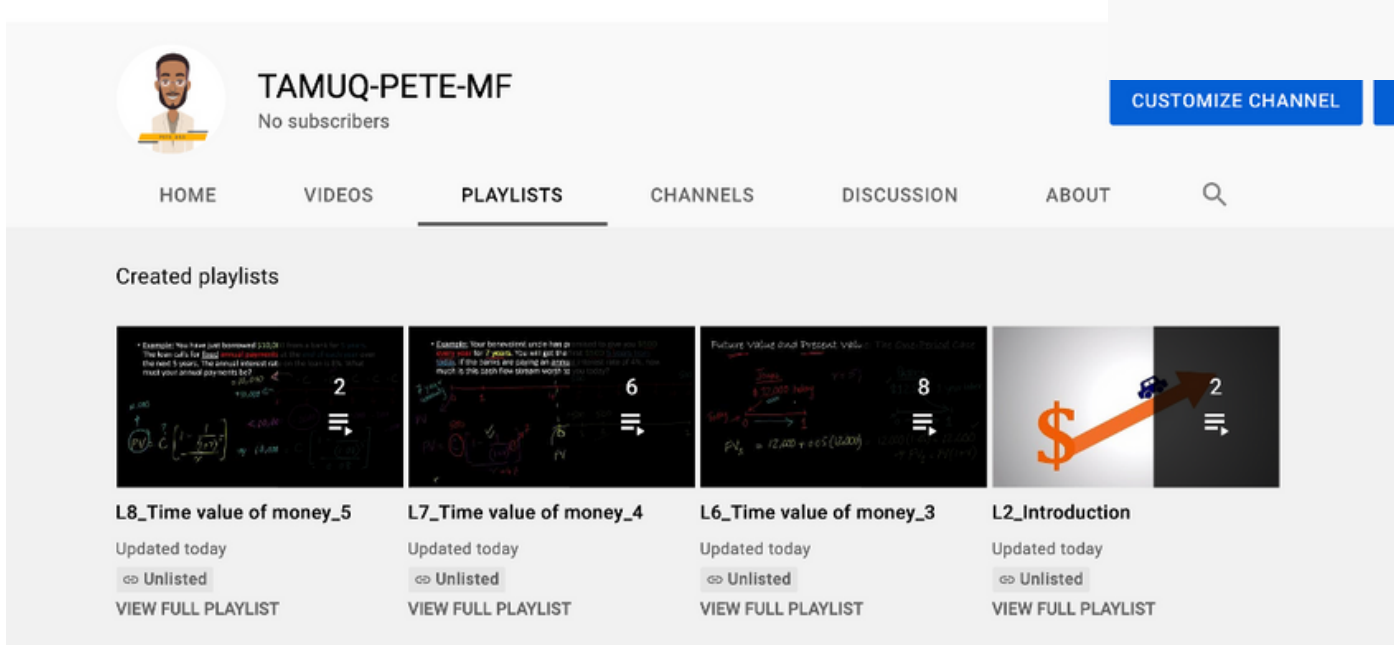
The re-designing stage began with re-visiting the course learning outcome, as PETE 353 is content dense for one semester. Essential topics to be covered were kept, and the extra ones were omitted. The team then started thinking about the different tools that could be used to help students in the learning process and that students can actively engage with. The tools suggested included:

- **Quizlet:** a website that allows you to create flashcards of definitions and terms, but also then has some games for students to use to practice and can also allow a Professor to turn it into a quiz. A professor is also able to monitor when students log-on to work on it.
- **Kahoot:** another tool used to interact with students live and put them in a competitive mode to engage with the content of the course.
- **YouTube videos:** a space where whiteboard explanation style videos that work through examples will be included with additional questions for students to try for themselves. The channel will also be broken down per lecture topic with additional videos recommended by the instructor. Students were also asked to add videos no more than 3 minutes in relation to the topic on Canvas discussion board, which will be reviewed by the instructor and added to the channel. Students received incentives for this work.

Additionally, we also discussed teaching styles in class such as passive teaching, active, and a mix of both.

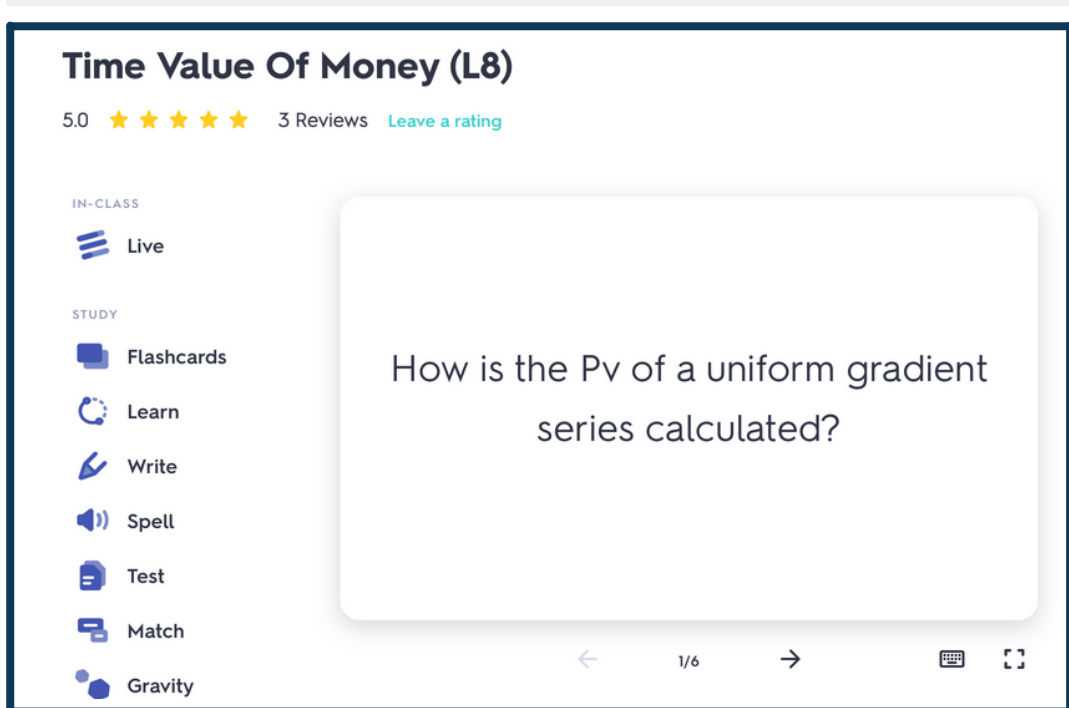
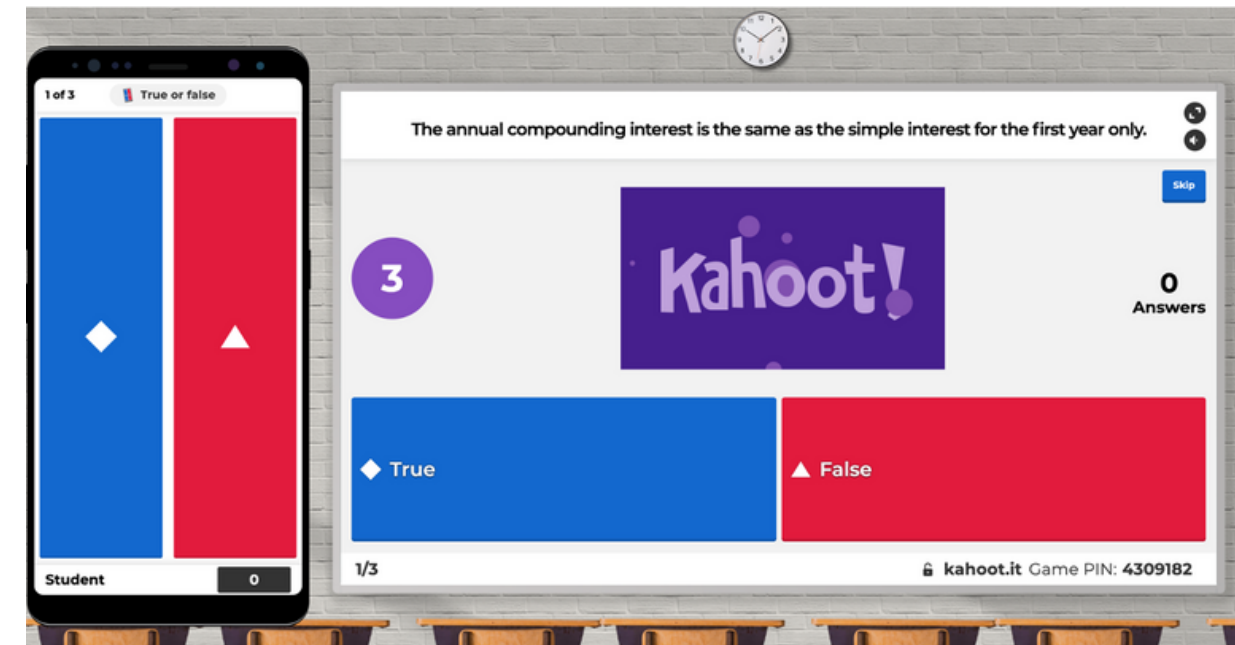
Passive	Active & Passive	Active
Giving a lecture to students, asking them questions as normal, no activities included.	Giving a lecture in the first half of the class, then allowing students to actively participate in an activity whether discussing or solving an example in groups/ with the class.	- Solving questions in class as a team - Having a class competition - Playing Kahoot - Making flashcards on Quizlet to re-call - Discussing answers and engaging in a conversation.

Future Youtube Channel

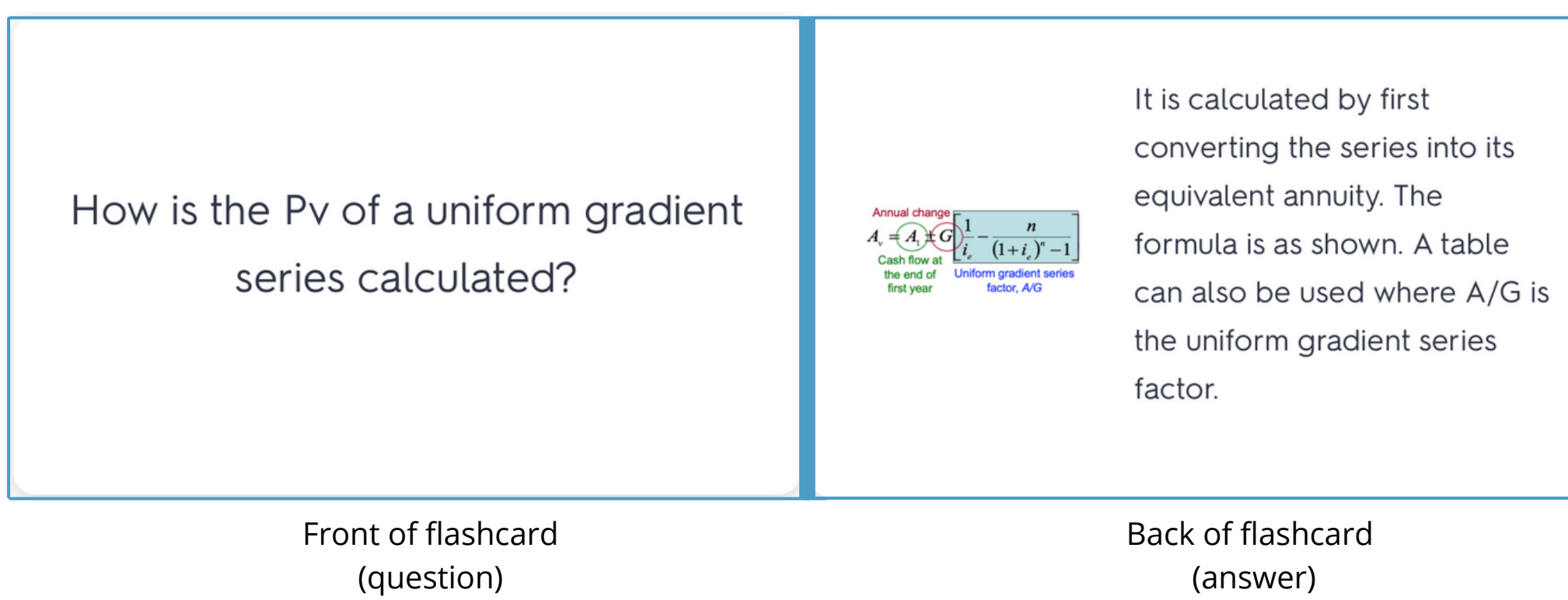


Tools

Kahoot competitions



Quizlet Flashcards



Assessment & Feedback

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To assess the changes made to the course, the team used three different methods in order to evaluate, monitor and improve the course.

- Two course evaluation surveys on the current class.
 - When only passive learning was used to teach the class.
 - When active learning was included in teaching.

The team created an anonymous google form course evaluation. This was used to gain an understanding on how current students were finding the course, whether the workload was good or too much, their understanding level, and how enjoyable they were finding the course. After the instructor integrated the active method, another course evaluation was sent with the exact same questions as the first one, with minor changes in specific to the active method. An additional section was also included to compare both passive and active to see what students preferred the most.

- Focus group interviews with:
 - Six students from the current class (Fall 2021)
 - Six students from the previous class (Fall 2020)

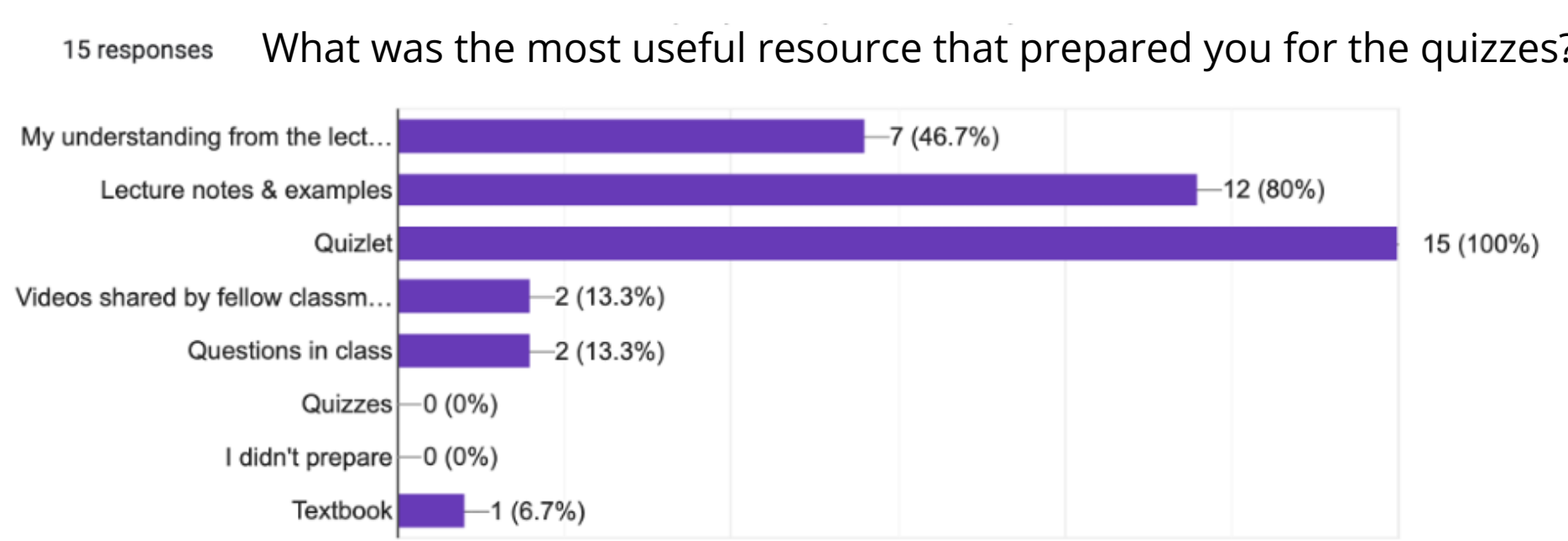
The two research assistants were the ones to conduct this focus group so students felt that there was space to speak freely. This was done in two sessions, one with the previous class and one with the current class to gather a well-rounded understanding of how students found the course through the different methods they were taught in. Students from a variety of levels were selected to help balance the data.

- Observation of class participation by the instructor.

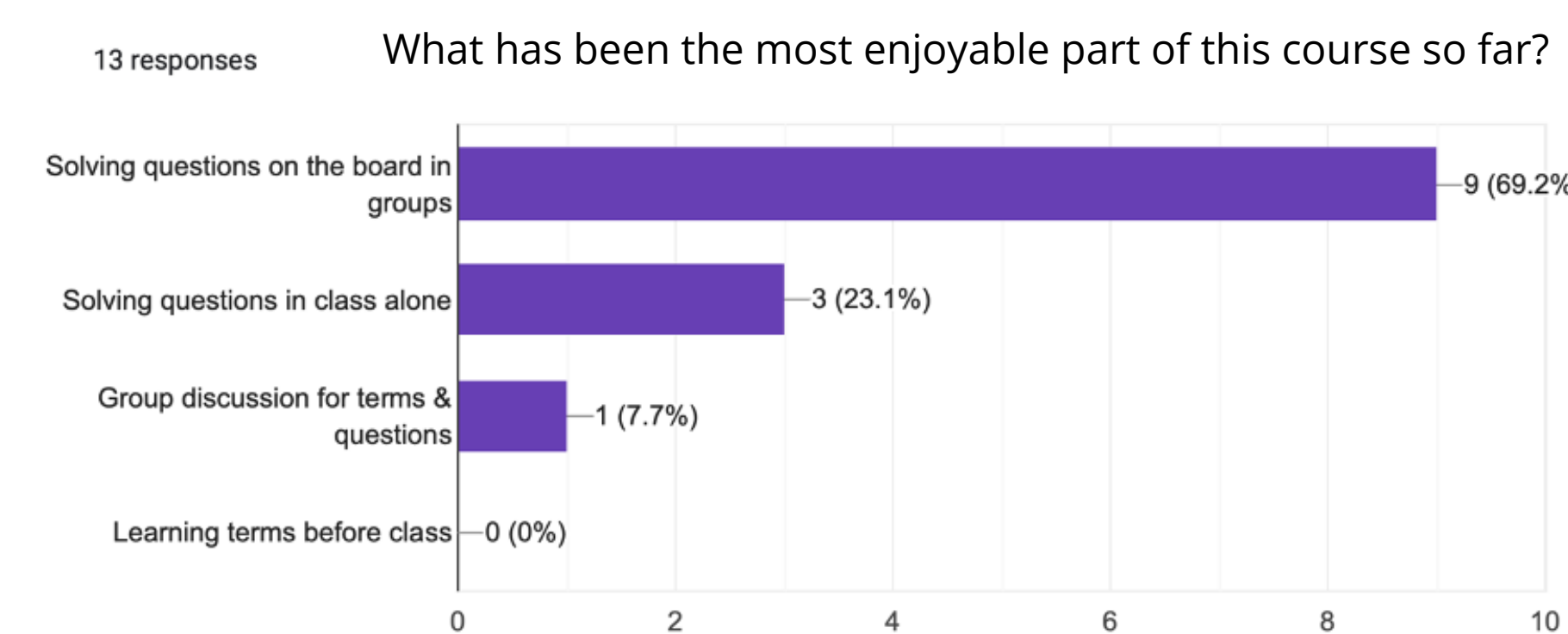
Results & Discussion

Course Evaluation Responses:

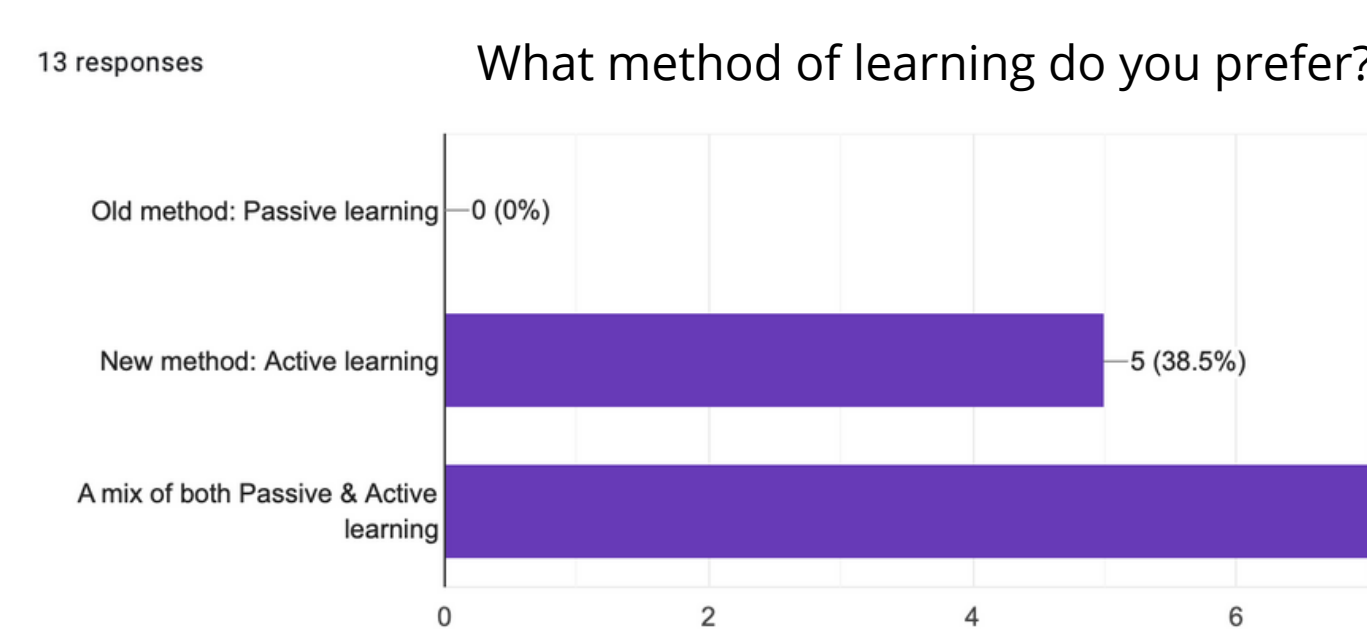
Only Passive Learning



Active Learning



Passive and Active Learning



Only passive learning:

13.3%

students found solving questions in class useful in quiz preparation.

Introduction to active learning:

47%

students found solving questions on the board, in class as a group, useful in quiz preparation.

Course Evaluation (1) comments

"Interactive activities would further help me understand the concepts"
"Everything so far is great, the material is interesting and useful for the future."
"So far it's been going pretty well"

"it felt like we were memorizing but not understanding."
"I wish we had in-class work to solve some equations"
- same person

Old Class

"I wish the course had more examples and solving in class that would help in understanding how to apply knowledge."

Focus Group Responses:

"the material was huge, not doable in one semester."

Course Evaluation (2) comments

"The active learning method is a new learning approach that I enjoyed in the past lectures. However, I do think that it should be mixed with the first delivery method"
"[want] more in class assignment"

"I think there should be a good balance between active and passive. I like if we could solve example problems in groups after you explain a concept"

"I think it prepares us more for the exam and helps us understand better"
"I feel as if I display the most effort using both methods"

"A mixture of both is preferable as the lecture helps us understand the basics and solving questions in class alone helps with active recall of what I just learned."

Current Class

"I really enjoyed the class where we did questions as a group in class. It was fun!"

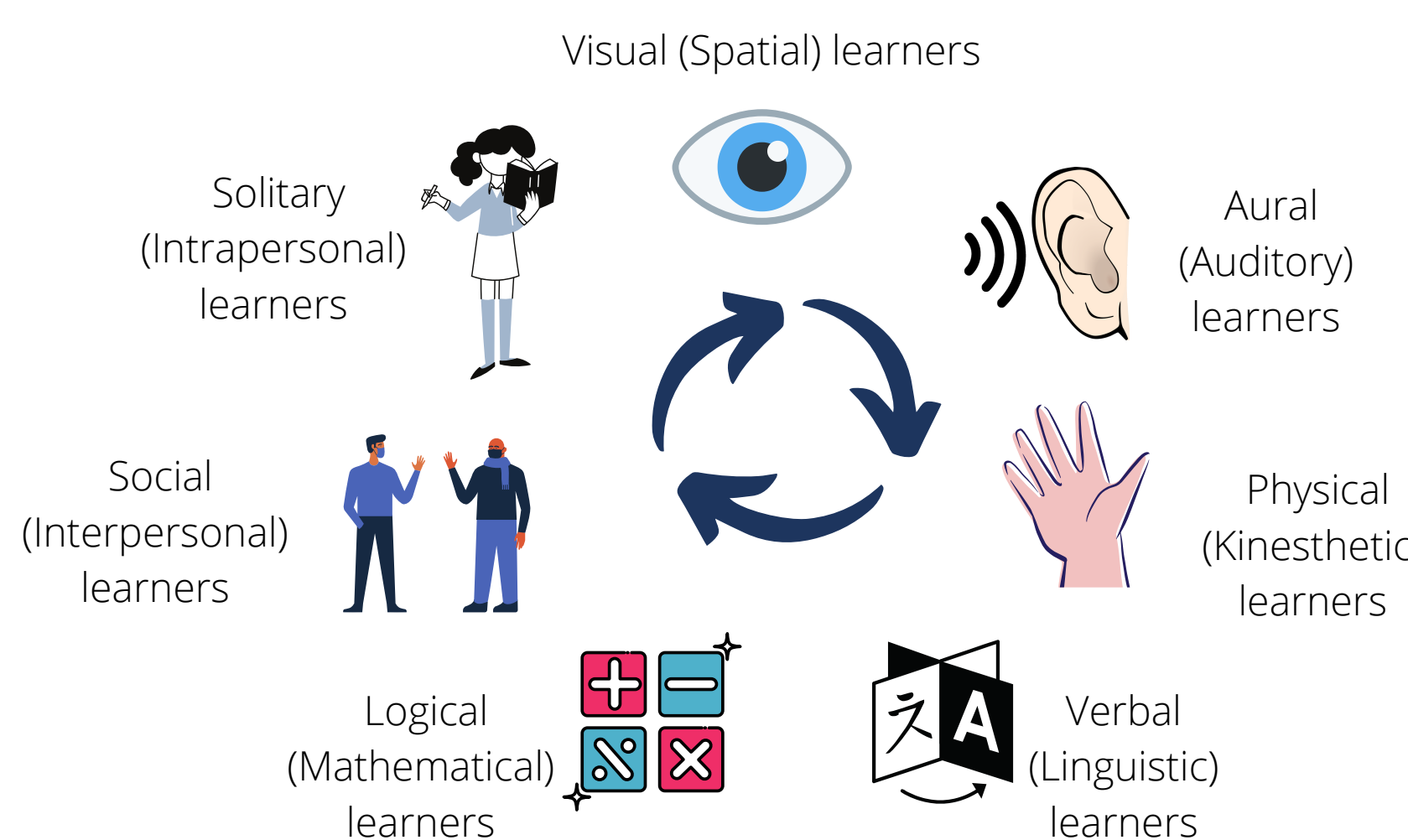
"I liked once when [the instructor] told us to go search a couple of terms and in the next class we were in groups and we explained the terms to each other to compare what we found. I felt like that was useful."

Instructor's Observations:

- Students are more active in class when there is active learning rather than only passive learning.
- Even though the class is an early morning class, the students have a longer attention span when taught using active learning techniques.

TYPES OF LEARNERS

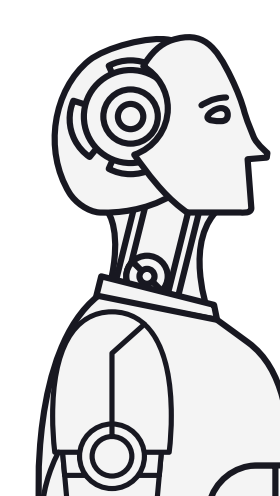
After reviewing and evaluating the different styles of teachings (passive vs. active) in our meetings, the team discussed the idea of how there are different types of learners. Students absorb information in different ways that cater to their personalities and their way of thinking. Knowing this is important, as it allows us to find ways to integrate different learning styles and ensure that students are understanding in the best way possible.



Source: "7 Types of Learning Styles to Know: How to Accommodate a Diverse Group of Learners." by Alicia Beharry.

What's the takeaway from this?

Students are not hardwired machines!



That's right! Students' brains and learning styles come in all shapes and sizes. We all learn in different ways, and thus, we cannot expect students to sit, listen, memorize, learn, then do the exam.

We need to engage in conversations, allowing students to ask questions and engage with the course.

Conclusion

To conclude, during this project we were able to gain a new understanding of how students enjoy the course, what they wish could be improved, as well as their different learning abilities.

The team saw improvement in understanding attention span, and engagement in the class with the new applied method and used tools. The team has done this work for half of a semester and will continue to add new teaching methods, and observe the students until the end of the semesters. One of the new assessment methods that will additionally be used is the midterm feedback by the CTL. In regards to this course, because there is a lot of new and content dense material, students prefer a mix of both active and passive learning because it captures their attention and gives them the opportunity to apply their knowledge and solve engineering problems. A major limitation was insufficient amount of class time to cover syllabus using both a passive and active learning techniques. To solve this, the instructor needs to pick the most important topics that will help students and this was apparent in their feedback as well.

END