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Tools for online learning Spring 2020
Project 2

Write up

Part I

Process Design:

The topic of our course is how an Induction cooker works. Students will learn the knowledge through a jigsaw activity. They will work toward a shared learning goal, which is to learn about the working mechanism of an induction cooker. Our instruction is chunked into three parts presented in the form of videos.

Students will work as a team of three. They will distribute the tasks among themselves. Each student in a group will select one of the three tracks, then he/she will study the material of the corresponding track.

After watching the instructional video, students will complete a formative assessment to evaluate their learning outcomes. After that, they will share what they have learned with their teammates who have learned the other parts of the working mechanism.

Then they will complete a summative assessment integrating knowledge of all three parts. And their final grade will be the average score of the three students in the group.

Time constraints Design:

We expect students to collaborate in person and synchronously. To make sure that everyone is learning at the same pace, we set time constraints for each step. Students will be given 8 minutes to learn their own part, 15 minutes for discussion, and 15 minutes for the final quiz. For the individual learning part, they can not jump to the next step until the section timer’s up. On the other hand, once time’s up, the system will automatically jump to the next section.

Behavior seeking:

We expect students to complete the following steps throughout the process:

Decide on which part to learn - Learn the material -- complete the formative assessment --- share and discuss with teammates --- complete the summative assessment

Incentives:

The summative assessment covers all three parts of the knowledge, students' shared learning goal is to learn about the whole working mechanism and perform well in the quiz. Thus, they will have to rely on their teammates to learn the other parts of the material and will have the motivation to engage in the discussion to learn from their teammates.**(positive interdependence)**

Additionally, their grade will be the average score of the team, so they have the responsibility to share their knowledge and facilitate other people to learn in order to help them get better scores. **(individual accountability)**

Part II

Instructional Changes

We chunked the instructional video of project 1 into three parts according to the content. We chunked them into themes about Magnetic Field, Magnetoelectricity, and Ferromagnetism. We also generated formative and summative assessment questions based on the instruction. We did not make additional changes to the instructional content other than chunking, but since the process of the jigsaw is more complicated, we made an introduction video to explain the whole process of the cooperative learning experience to give students a better idea of what to expect.

Technical Changes

We built a website to implement the jigsaw activity and put more effort into designing beautiful and interactive interfaces.

We added more interactive features. Learners can click the 'next' button to proceed to the next step.

At the beginning of the course, students will be led to different tracks based on the different topics that they select.

Students will receive immediate feedback when they complete the questions in the formative assessment. As for the final quiz, they will receive feedback after they submit the quiz.

We also added a timer feature to ensure synchronized learning.

After students complete the final quiz, they will be asked to enter the scores of their teammates and the system will calculate the average score of the team.

limitations of re-using instructional material

It is difficult to chunk the instruction into three even sections, since some of the contents are more complicated than the other parts. Without making changes to the material, it's hard to make sure that each part requires the same amount of time and effort to learn.

Part III

We tested our design with two groups of students and made some observations:

Group 1

Hypothesized Behaviors:

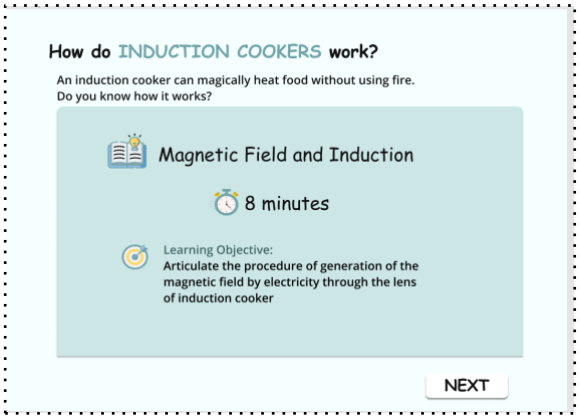
1. Students will master their assigned parts.
2. Students will engage in the discussion and learn from it.

Actual Behaviors:

1. Students did not watch the video carefully and skipped some content.
2. While doing the formative assessment, students wanted to go back to see the instructional video.
3. Students did not have a clear direction of what and how to discuss, which led to unproductive discussion.

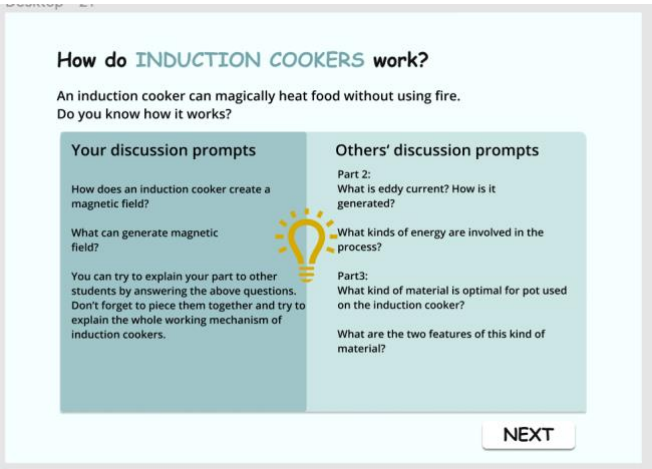
Iterations:

1. Add learning objectives at the beginning of each part to ensure learners learn with goals in mind and get the most out of the instruction video. Through the combination of visual and text objectives, we hope to boost their effectiveness of learning without adding extraneous processing.

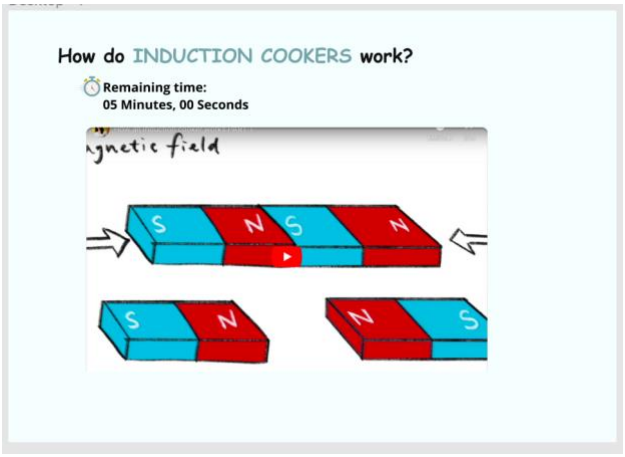


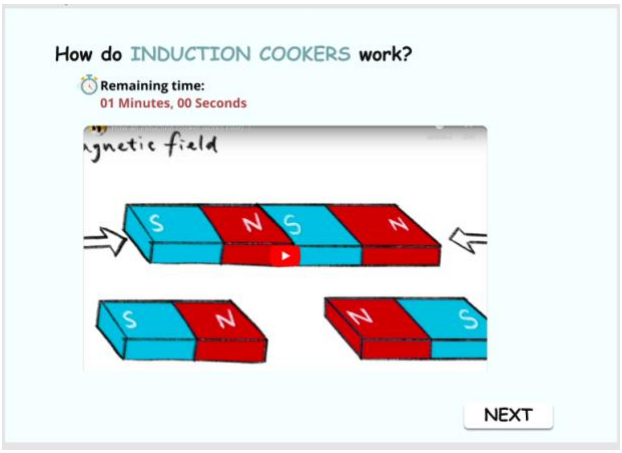
2. Add a transition page to introduce the purpose of the discussion and provide incentives for individual accountability.

3. Add discussion prompts to make sure students are clear about what to teach and learn. Using channeling principles, students reduce the degrees of freedom of tasks and engage in more meaningful discussion.



4. The next button will not occur until the video is closed to the end, so learners can not skip content easily. By decreasing the learner control at the instruction stage, learners will get more exposure to instructional materials.





Group 2

Hypothesized Behaviors:

3. Students will participate in the discussion.
4. Students as a group will score above 80%.
5. Students have a better sense of knowledge scope in an individual's part.

Actual Behaviors:

1. Students participated in the discussion. When one presented, others would ask questions to further the discussion.
2. Students forgot some knowledge(Eddy current and the term “ferromagnetism”) and sometimes may not articulate clearly even after questions.
3. One student started recapping for everyone without prompt.
4. The final score is 5.67/6. The accurate rate is 94.5%.

Changes in Behaviors:

1. Compared to group 1, learners in group 2 spent more time on the video and learned more from it. (results of less learner control)
2. Compared to group 1, learners in group 2 had a more productive discussion with the aid of discussion prompts. (results of discussion prompts)

Future steps:

We will display the discussion prompt before entering the formal discussion and allow users to go back to watch the video for reviewing after seeing the discussion prompt.