

Muddy Card System Documentation

Student Interface:

Students will engage with the student interface to enter their muddy card point – that is, what they deemed the most confusing point from the lecture. Students can use either a mobile device or laptop/computer.

1. Students will either click on a website link to visit the student interface or scan a QR code within the lecture. The link will be unique to each unit of study.
2. On opening the link, students will be prompted to ‘Begin!’ if the details provided are correct:
 - a. The system will already know the correct unit based on the URL.
 - b. The system will know which lecture week it is. We will work with lecturers/unit coordinators to set the times up correctly for their unit (for example, if lectures are on a Wednesday, a lecturer may choose to allow students to submit the muddy card for the previous lecture until Tuesday night).

Press 'Begin' to submit a muddy card for
TEST1001, week 5.

Begin!

Is the class and lecture week wrong? [Click here to manually choose](#)

- c. As a fail-safe, if the lecture name and time were wrong, the student can press “Click here to manually choose” to manually specify the lecture and muddy card they want to submit:

Which muddy card is this for?

Which subject are you taking?

Which lecture is this muddy card for?

Begin!

3. The next page asks for the student to provide their muddiest point and other short inputs:

Enter your SID:

Week 1 Muddy Card (TEST1001)

What was least clear to you in this lecture?

- Please write the ONE most confusing part of the lecture.
- Don't write anything other than what was confusing.
- Be specific.
- Bad examples: "Photosynthesis", "Merge sort"
- Good examples: "Why sunlight is needed in photosynthesis", "How merge sort is considered a divide+conquer algorithm"

I wrote this muddy card response because I...

- do not understand this.
- think I understand this but want to check.
- would like to learn more about this.
- just wanted/needed to do the muddy card.
- [some other reason].

Do you consent to your class and lecture week and muddy card response and checkbox choices being recorded and used in a publicly available data set and subsequent research publication(s)? Your SID number will NOT be stored and will NOT be included in the research publication(s) or public data set. If you have any questions about this research project, please read the student participant information sheet [here](#).

Yes - I consent.

No - I DO NOT consent

[Return](#)

[Submit](#)

4. After pressing “Submit”, on some weeks, the student will be taken to an extra page that asks them to indicate whether peer-selected responses are the same muddy point as what they entered:

Your Muddy Card Response: What is sunlight needed in photosynthesis?

Would an answer to any of the following also answer your question? You can choose **zero or more** options. When finished, press "submit" to continue.

- Why sunlight is needed in photosynthesis
- Why is sunlight needed?
- Why is water necessary for photosynthesis?
- How is energy from sunlight converted into a form the plant can use?

[Submit](#)

5. After pressing “Submit”, the student sees a final summary page:

Thank you!

Data collection consent status: Does Consent

SID: 123456789

Muddy card response: Why is sunlight needed in photosynthesis?

Time Submitted: 2025-11-18 03:17:24

Teacher Interface:

The teacher interface is where the lecturer can view the muddy cards submitted by their students. The teacher interface should be accessed on a computer (not a mobile device).

1. The teacher will click on a provided website link. This link will be restricted – only the lecturer and research team will have access.
2. On opening the link, the teacher will choose the lecture they want to analyse the muddy card points for:

Teacher Interface: TEST1001

Welcome!

Which lecture do you want to analyse? Week 1

Begin!

3. After clicking ‘Begin’, the teacher can choose to:
 - a. Stop students from submitting muddy card responses.
 - b. Download the already collected responses.
 - c. Begin analysis of the muddy card responses.

Week 1 Muddy Card (TEST1001) - Teacher UI Variant Y

[Return](#)

You have collected **186 responses**. [Refresh](#)

Students **CAN** still submit muddy card responses.

Click the button to start analysing the responses: **Begin Analysis**

Download Student Responses

Do you want to download all responses? Keep all responses.
 Specify a time cutoff after which responses are not included.

Contents to include in download:

- Muddy Cards
 Submission Time
 Student ID (SID)

[Download](#)

After pressing ‘Begin Analysis’, the teacher will see ‘Teacher UI Variant Y’, ‘Variant X’ or ‘Variant Z’. All interfaces will be experienced throughout the study. The following sections demonstrate both variants.

Teacher UI Variant Y

1. Student responses are arranged down the screen into clusters separated by grey lines. These separators indicate that the student responses are deemed semantically similar.

Week 1 Muddy Card (TEST1001) - Teacher UI Variant Y

Return

Clustering

- The student muddy card responses have been assigned into clusters below (separated by the grey lines).
- The "number of clusters" can be adjusted by the slide in the **main controls** section.
- By default, the representative response for each cluster is bolded. The representative quote can be modified by clicking on a different response in the cluster. Additionally, clicking on a bolded response will unselect the response. If a cluster has no representative response when proceeding to analysis, the cluster will be ignored.
- Optional controls are provided in the **optional controls** panel. Hover over the question marks to get more information.

Main Controls **Optional Controls**

Number of Clusters: 10 192

Continue to Step 2

Why do some plants do photosynthesis differently?
Why do plants in different environments photosynthesize differently?
Why do different plants have different photosynthesis rates?
Why do some plants grow faster than others?
Why do some plants photosynthesize faster?
Why don't all plants use C4 photosynthesis?
Why don't all plants use the same photosynthesis process?

How does the plant know when to start photosynthesis?
How does a plant cell know when to start photosynthesis?
How do plants know when to photosynthesize?
How do scientists measure photosynthesis?
How do scientists study photosynthesis?
How do we know plants use photosynthesis?
How is energy from sunlight converted into a form the plant can use?
Why is sunlight used in photosynthesis?

How do desert plants do photosynthesis?
Why do desert plants use C4 photosynthesis?

2. Under the “Main Controls” on the right, the user can adjust how many clusters the student responses are separated into. The user can adjust these until the displayed clusters are tuned to the desired granularity.
3. The bolded response in each cluster represents the response representing the current cluster. This can be changed to another sentence by clicking on the desired response. Alternatively, you can deselect the current bolded sentence so that a cluster has no representative sentence (in this case, this sentence will be ignored in the final step 2 summary page).
4. The optional controls panel (in the top right of the above image) allows for filtering, rearranging the clusters on the screen, and changing how the representative quotes are determined.
5. When satisfied with the number of clusters and representative quotes, the user clicks on the ‘Continue to Step 2’ button.
6. The ‘Results’ page allows the user to view the representative quotes of each cluster, arranged in descending cluster size.

Week 1 Muddy Card (TEST1001) - Teacher UI Variant Y

Return

Results

- Below, the representative quote for the clusters are arranged in descending order from largest to smallest cluster.
- You can download a text file of the clusters, as well as downloading the raw responses.

1) Why is photosynthesis so complicated?
2) How do different wavelengths of light affect photosynthesis?
3) How do scientists measure photosynthesis?
4) Why do some plants do photosynthesis differently?
5) Why do leaves have veins?

Continue to Short Weekly Survey

7. Clicking the ‘Continue to Short Weekly Survey’ button takes the user to the optional survey.

Teacher UI Variant Z

- Teachers will be provided with a button to generate a summary. The teacher can also filter which responses are included in the summary:

The screenshot shows the 'Muddy Card Summary' interface. On the left, a grey panel contains the title 'Muddy Card Summary' and instructions: 'To generate a summary of the muddy card responses use the controls on the left to: 1. Select which responses you want to be included in the summary (filtered by student response intention) 2. Press 'Generate Summary' to generate a short summary. This will take around 30 seconds.' Below these instructions is a blue link: 'Follow the instructions above to generate the clustering summary.' On the right, a white panel titled 'Main Controls' contains two sections: '1) Choose which student responses to include in the summary.' with a dropdown menu set to 'Keep All Responses', and '2) Generate Response:' with a 'Generate' button. At the top right of the main area is a red 'Return' button.

- After pressing “Generate”, a loading wheel will appear, and approximately 30 seconds later, a summary will appear:

The screenshot shows the 'Muddy Card Summary' interface after generating a summary. The left panel now displays a summary of responses: 'There was a significant diversity in the responses, with many students raising different aspects of photosynthesis as confusing.' Below this is a section titled 'Light Reactions and Photosystems' with the text: 'Many students found the mechanics and role of the light-dependent reactions, including the electron transport chain and photosystems, confusing.' followed by a bulleted list of common student misconceptions and representative responses. The right panel remains the same as the previous screenshot, with the 'Main Controls' section and a green 'Continue to Short Weekly Survey' button at the bottom right.

- Clicking the ‘Continue to Short Weekly Survey’ button takes the user to the optional survey.