

DrNotes: A System to Help students Effectively Review Their Written Notes

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Note-taking and reviewing is important

Note-taking and reviewing are the most common way of studying.

When researchers investigated the effect of note-taking and reviewing on learning, they found that:

- 1) The overall effects of note-taking and reviewing are substantial compared to no note-taking and no reviewing in learning. [1]
- 2) The benefit of note-taking appears to be derived from having a subsequent opportunity to review notes, and not from the act of note-taking itself. [2]

While both are important, **note-reviewing** is more critical in learning than note-taking.

[1] Keiichi Kobayashi (2006) Combined Effects of Note-Taking/-Reviewing on Learning and the Enhancement through Interventions: A meta-analytic review, Educational Psychology.

[2] Nicholas H. Van Metre and John F. Carter (1975) The Effects of Note-Taking and Review on Retention of Information Presented by Lecture.

However, reviewing handwritten notes is difficult

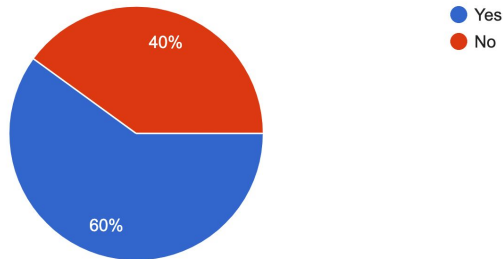
Survey with 15 students who have experiences using iPad for note-taking

60% (9 out of 15) had difficulty looking at the notes when reviewing.

1. Difficult to understand the notes they wrote down. (n=6)
2. Do not recognize which part of the note is important. / Do not recognize their handwriting. (n=4)

Are there any difficulties in the notes when you look at them later?

15 responses



“ I have hard time understanding the class so I just write down what I hear, which results in bad handwriting and unorganized note. It's more likely my fault rather than my iPad's 😊 ”

Writing and reviewing computer-typed notes is more difficult

“Pam Mueller and Daniel Oppenheimer, the psychologists who conducted the new research, believe it's because students on laptops usually just mindlessly type everything a professor says.”

“Those taking notes by hand, though, have to actively listen and decide what's important — because they generally can't write fast enough to get everything down — which ultimately helps them learn.”

[Related Papers]

[The Pen Is Mightier Than the Keyboard: Advantages of Longhand Over Laptop Note Taking - Pam A. Mueller, Daniel M. Oppenheimer, 2014](#)

[Law Student Laptop Use During Class for Non-Class Purposes: Temptation v. Incentives by Jeff Govern :: SSRN](#)

[LAPTOP USE IN CLASSROOMS The Arguments For Laptops: • Laptops allow for increased ease and speed of note-taking and engagement](#)

Ubiquitous laptop usage in higher education: Effects on student achievement, student satisfaction, and constructivist measures in honors and traditional classrooms
(<https://dl.acm.org/doi/10.1016/j.compedu.2008.05.006>)

Problem Statement

When students are reviewing the lecture after class,
it is difficult for them to **review the lecture solely with their notes**,
as they have unorganized and incomplete notes and a vast amount of recordings.

Identified Tasks

1. Comprehend the written notes
2. Listen to the recordings and fill in the missing parts
 - a. Identify the exact context of the notes
 - b. Fill in the missing parts with the help of recordings
3. Reorganize the notes into a more organized format

Identified Tasks & Why They Matter

1. Comprehend the written notes

→ Difficult to write notes in organized format and fully understand the lecture since most are real-time classes

2. Listen to the recordings and fill in the missing parts

a. Identify the exact context of the notes

→ Easy to forget why most parts were written down

b. Fill in the missing parts with the help of recordings

→ Easy to miss out on some parts during the class

3. Reorganize the notes into a more organized format

→ Crucial for the learning process

Solution: **DrNotes**

A system where people can utilize their written notes & lecture recordings to review the written notes with different features.



- 1) Searching for specific contents with keyword
- 2) Note-recording alignment and keyword graph
- 3) Note suggestion based on importance

Overall Components of DrNotes

Keyword graph

LC4003 – Academic Encounters, Life in Society, Chapter 1, pages 12 - 15

LECTURE 1

Hi. Welcome. Today we're going to be talking about how children learn social behaviors, especially how they learn lessons from the family — the most basic unit of our social structure.

There's a lot of discussion these days about how families are changing and whether non-traditional families have a good or bad effect on children. But it's important to remember that the type of family a child comes from is not nearly as important as the kind of love and support that exist in the home.

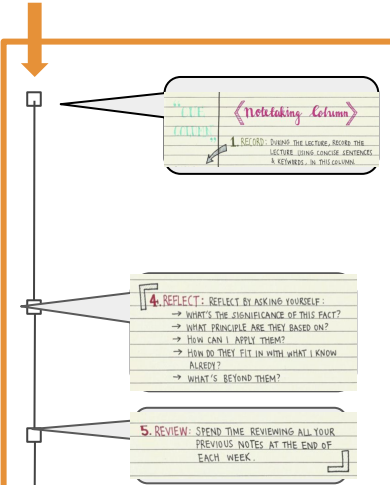
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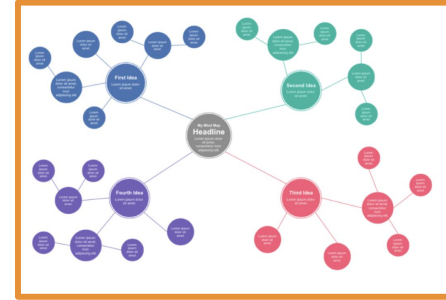
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Not surprisingly, punishment is extremely controversial, especially when the punishment is physical. Some of us grew up expecting to be spanked if we misbehaved. For example, our parents may have hit us on the hand if we talked back to them. But I don't agree that spanking can teach children anything, and sadly, some children are subject to really serious physical abuse. According to a study I just read, one in twenty-two children is a victim of physical abuse. Children who come from homes where violence is used to solve problems are much more likely to abuse their own children when they become adults and have their own families.

Timeline of lecture



Student's notes



Text transcription of recorded lecture

Feature #1: Keyword search

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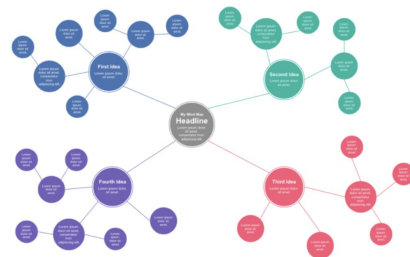
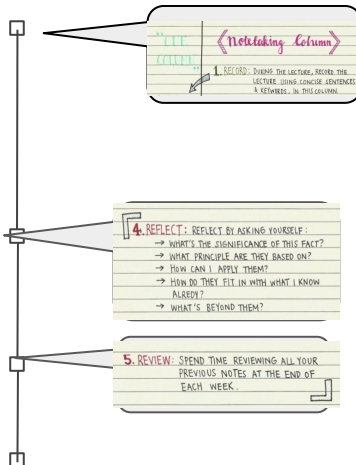
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HAI is fun



Helps to identify the exact context of the notes

Feature #2: Note-recording alignment and keyword graph

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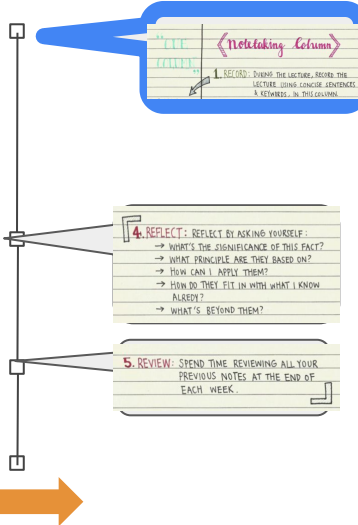
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Construct a keyword graph with notes

Align recordings with written notes

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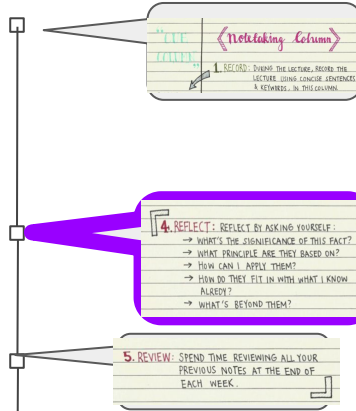
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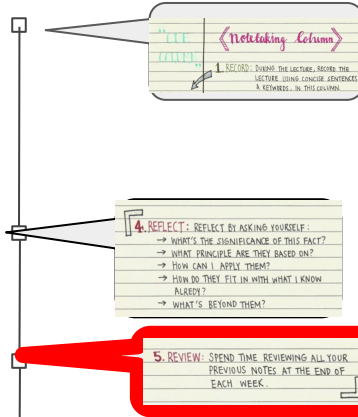
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Helps to comprehend the written notes

Feature #3: Note suggestion based on importance

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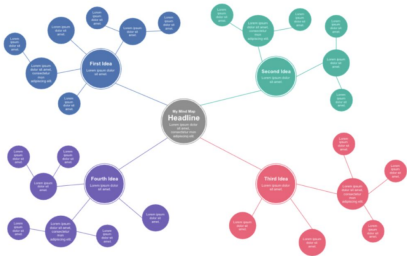
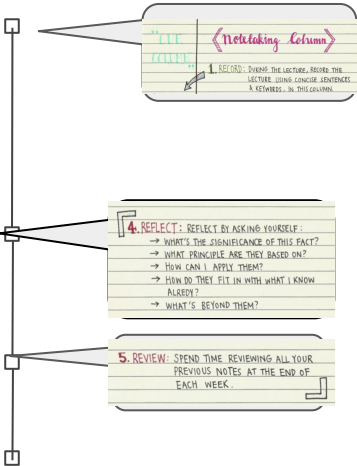
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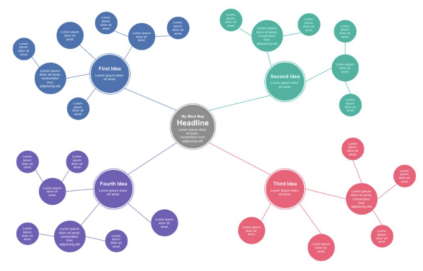
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LECTURE 2

The subject of today's lecture is *Culture Shock — Group Pressure in Action*. Culture shock, as you know, is the term used to describe the experience many people have when they travel to another country, and it can be seen as a manifestation of group pressure in action. It is a good example of group pressure, because it shows what happens when an individual suddenly experiences different cultural rules — the rules of another cultural group.

Now culture shock is a complex phenomenon, but I'm going to focus on three main ideas in this lecture. First of all, we will consider the reasons why people experience culture shock. Secondly, I will describe the different stages of this experience. Finally,



4. REFLECT: REFLECT BY ASKING YOURSELF:

- WHAT'S THE SIGNIFICANCE OF THIS FACT?
- WHAT PRINCIPLE ARE THEY BASED ON?
- HOW CAN I APPLY THEM?
- HOW DO THEY FIT IN WITH WHAT I KNOW ALREADY?
- WHAT'S BEYOND THEM?

5. REVIEW: SPEND TIME REVIEWING ALL YOUR PREVIOUS NOTES AT THE END OF EACH WEEK.

Comment suggestion:
HAI is fun (click to add)

Scroll down

Helps to fill in the missing, but important parts of the note

Role Distribution

Front-end



Jeongeon

Back-end, Model



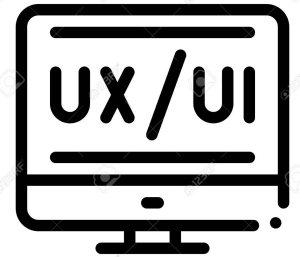
Junha

Model



Hyunji

UI/UX Design



Everyone

Finding Resources

Algorithm & Dataset

- Dataset: use if fine-tuning is necessary, from public datasets
- Algorithm: use common and publicly available models (e.g. text-to-speech, summarization)

Users to use & test our system

- Recruit students who regularly take notes while listening to lectures.
- Through a user study with our system, ask if the system helped in reviewing the notes.
- Evaluation metrics: time reduction in reviewing notes, understanding of the notes, completeness of the notes, effectiveness of each feature/interaction, etc.

Thanks for listening!