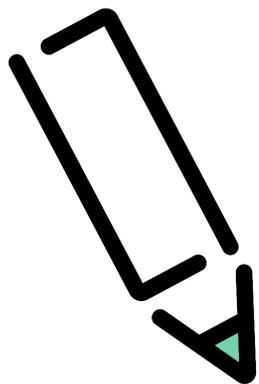


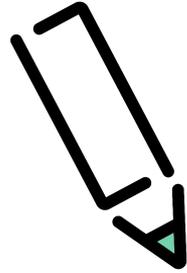
Volume Check





Materi**ALL**

auto-generated classroom materials



MateriALL

auto-generated classroom materials





Eunyoung Cho

UX Research



Joy Chu

Software Engineering



Nathan Khuu

UX Research &
Data Science



Helen Li

UX Design



UX Research

Interviews, Survey, Concept Testing, Usability Testing



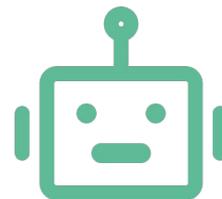
UX Design

Sketches, Wireframes, Mockups, Prototypes



Software Engineering

Front-End (HTML, CSS, JavaScript), Back-End (Python)



Natural Language Processing

Word Embeddings, Part-of-Speech Tagging



UX Research

Interviews, Survey, Concept Testing, Usability Testing



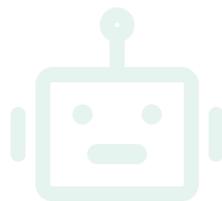
UX Design

Sketches, Wireframes, Mockups, Prototypes



Software Engineering

Front-End (HTML, CSS, JavaScript), Back-End (Python)



Natural Language Processing

Word Embeddings, Part-of-Speech Tagging

1. Teachers have too many extra responsibilities and not enough time.

“When you’re a teacher, it’s actually more like **five jobs** instead of one job.”

- High School Physics Teacher

1. Teachers have too many extra responsibilities and not enough time.
2. Teachers, especially those in Title I schools, want to prioritize investing personally in their students' growth,

“Because of the COVID pandemic, we’re focused right now on students’ **socio-emotional learning**, and learning how to be students in a classroom again.”

- High School Biology Teacher

1. Teachers have too many extra responsibilities and not enough time.
2. Teachers, especially those in Title 1 schools, want to prioritize investing personally in their students' growth.
3. Teachers have many secondary priorities, such as lesson planning, that limit their ability to fully invest in their students.

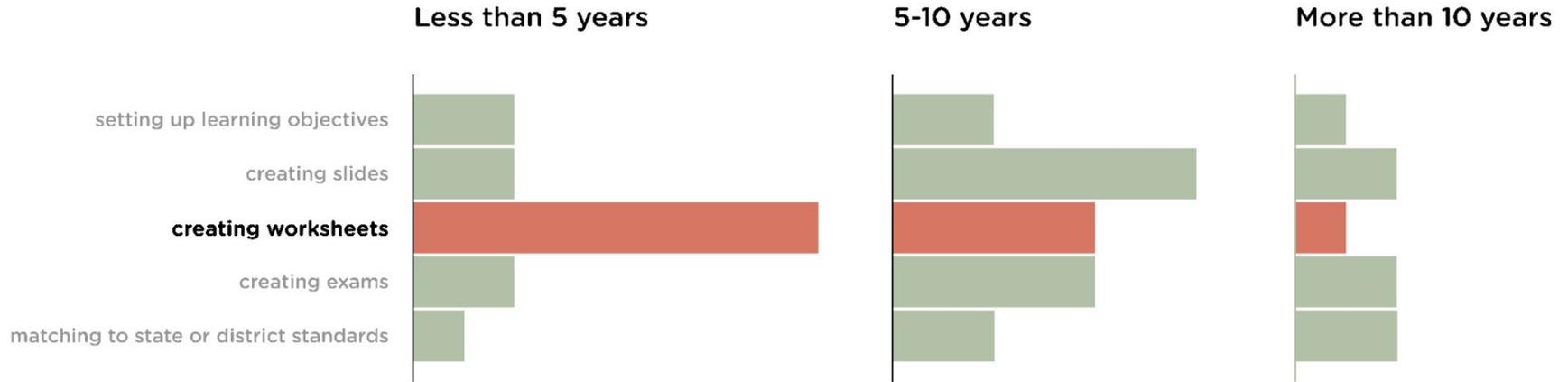
“All those resources that I make myself, like the Google slides on everything. **I wish I had someone to make it for me.**”

- Elementary School Teacher

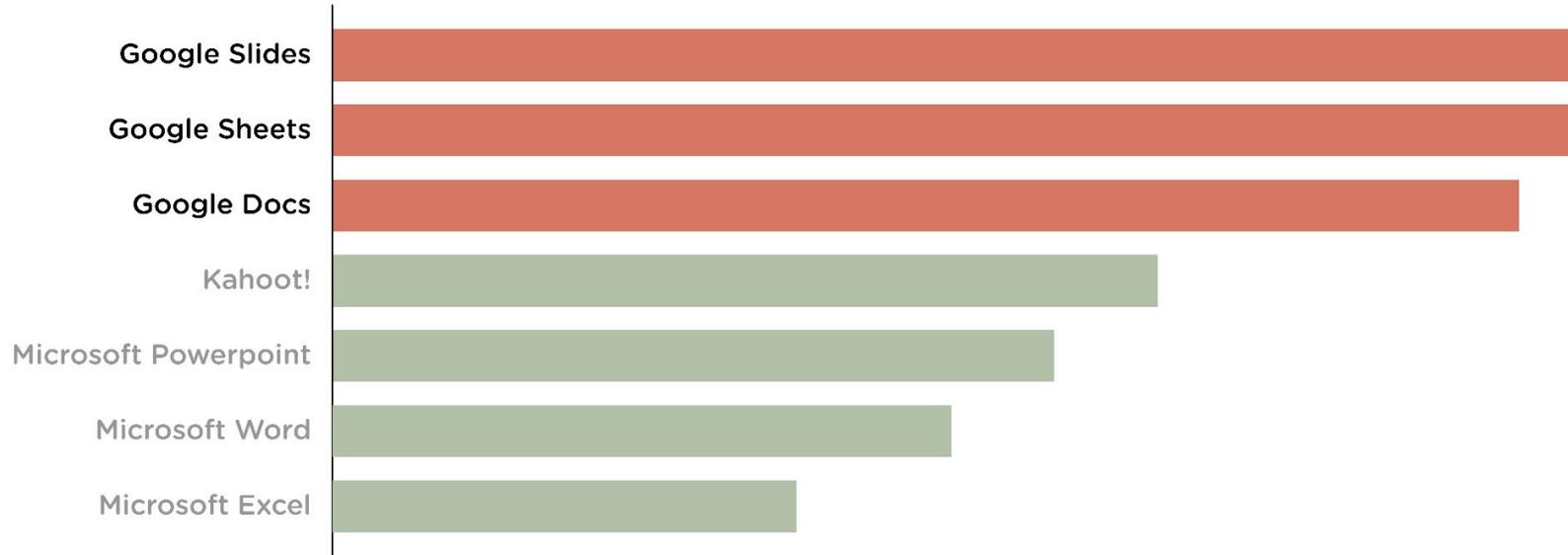


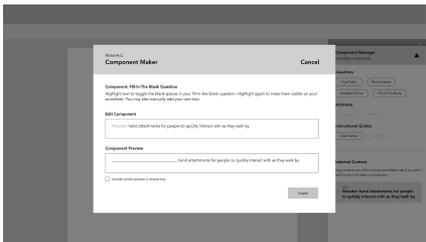
How might we make the lesson planning process **more streamlined** so that teachers have time for other responsibilities?

The Most Time-Consuming Part of Lesson Planning for Teachers with Different Experience



Digital Tools for Preparing Lessons and Materials





Design

Low, mid, and high fidelity screens



User Feedback

Concept testing and usability testing



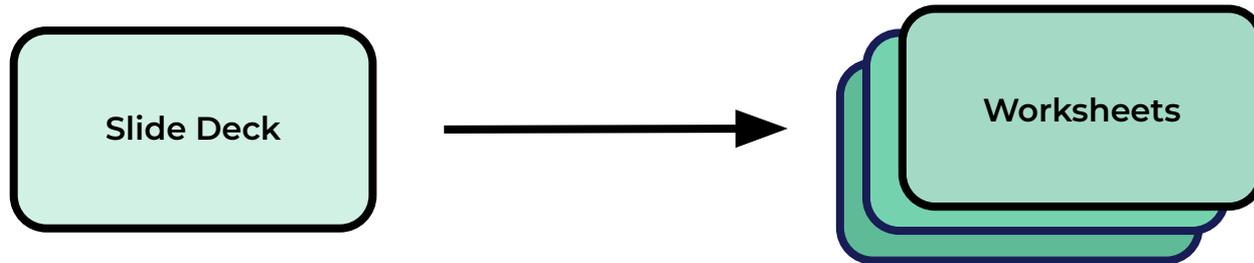
Development

Google Apps Script and API

What A **Google Docs Add-on** that uses teachers' existing slide decks to generate questions and format worksheets

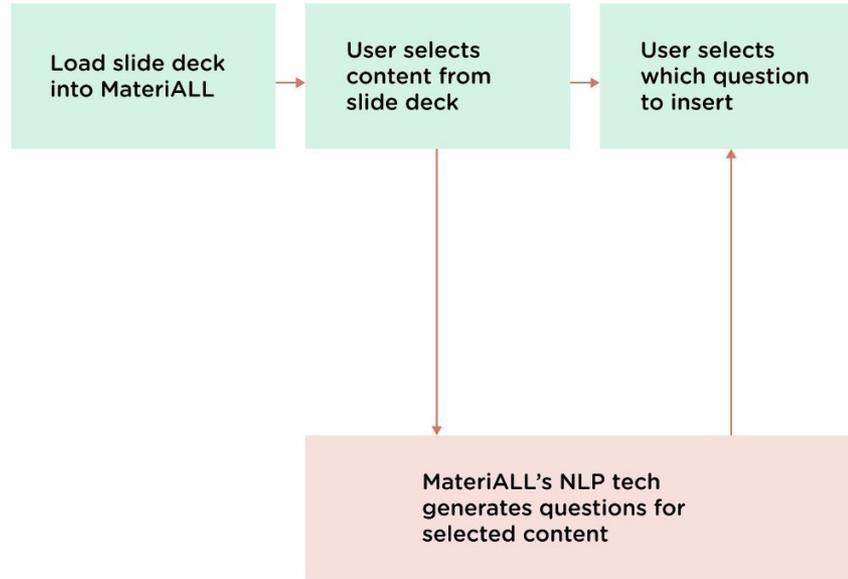
Who **K-12th teachers**, particularly those in Title I schools, new to their careers, and don't have pre-existing materials

Why Teachers want to invest in their **students' growth**, especially in light of the COVID pandemic, but they are restricted by the process of creating classroom materials.



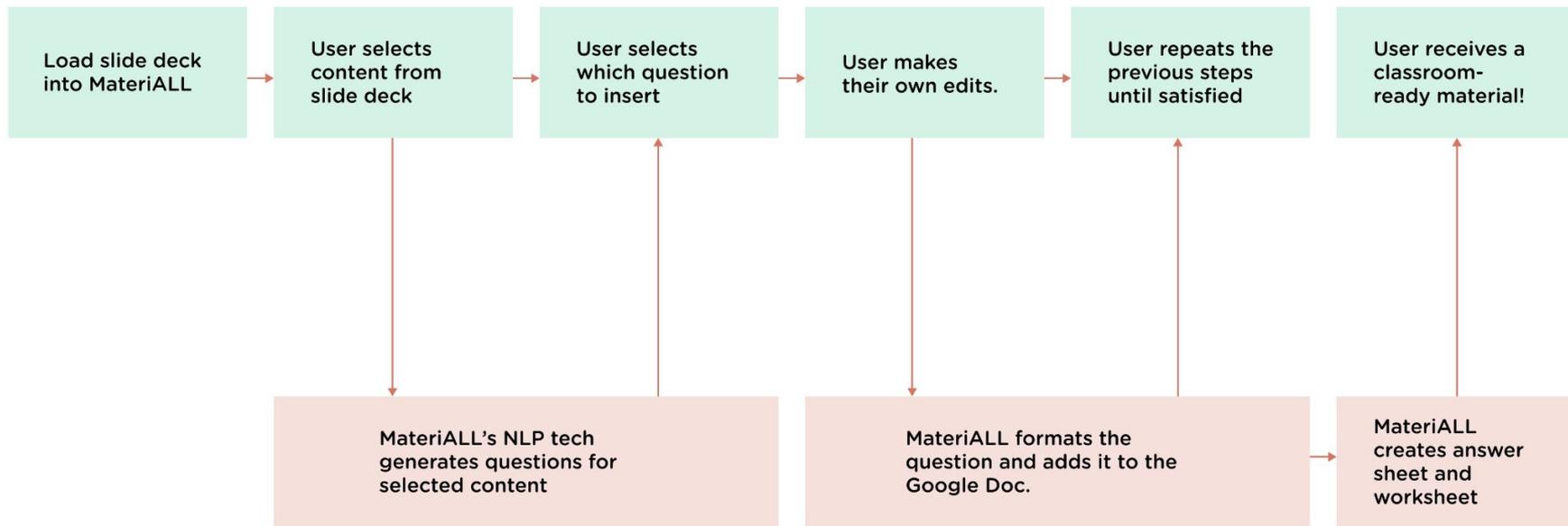
final solution

User-Facing



Back End

User-Facing



Back End

How might we make the lesson planning process **more streamlined** so that teachers have time for other responsibilities?



How might we make the lesson planning process **more streamlined** so that teachers have time for other responsibilities?

By **automating question generation and worksheet formatting**, we can take some of the lesson planning burden off of teachers.



Teacher-Centric Design

MateriALL aims to make teachers' jobs easier, and enables them to focus on their biggest priorities



Saved Time

Potential to significantly reduce the amount of time teachers spend on creating their materials



Helping Students

When we help teachers, we also help the students they educate

“[MateriALL] looks **great**, very **intuitive to use**. This would be the kind of program that I would actually [...] utilize.”

- High School History Teacher

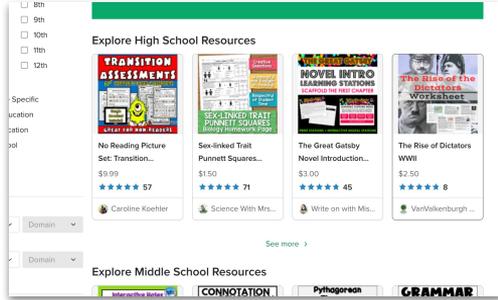
Special thanks to all the K-12th teachers and educators who worked with us on MateriALL. **MateriALL was made with and for you.**

We would also like to thank Prof. Kimiko Ryokai, the School of Information student affairs team, and our friends and family for their support. **Thank you!**



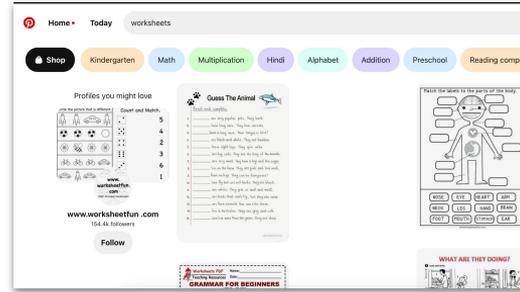
Questions?

Appendix



TeachersPayTeachers

Worksheets and activities for sale, by teachers



Pinterest, Google

Simple search for ideas, inspiration, etc.

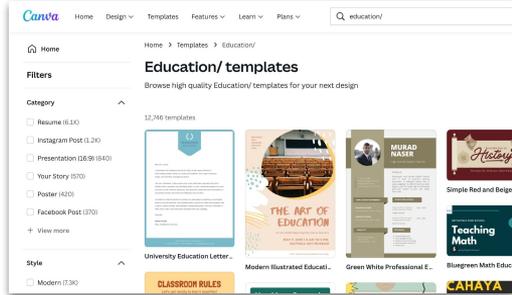


Other Teachers

Going down the hall and asking

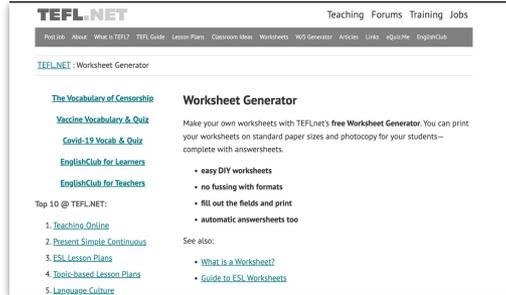
Teachers like personalization and “making it their own”

existing solutions: pre-existing activities



Canva

Beautiful worksheet templates



TEFL.NET

Diverse activities for young students

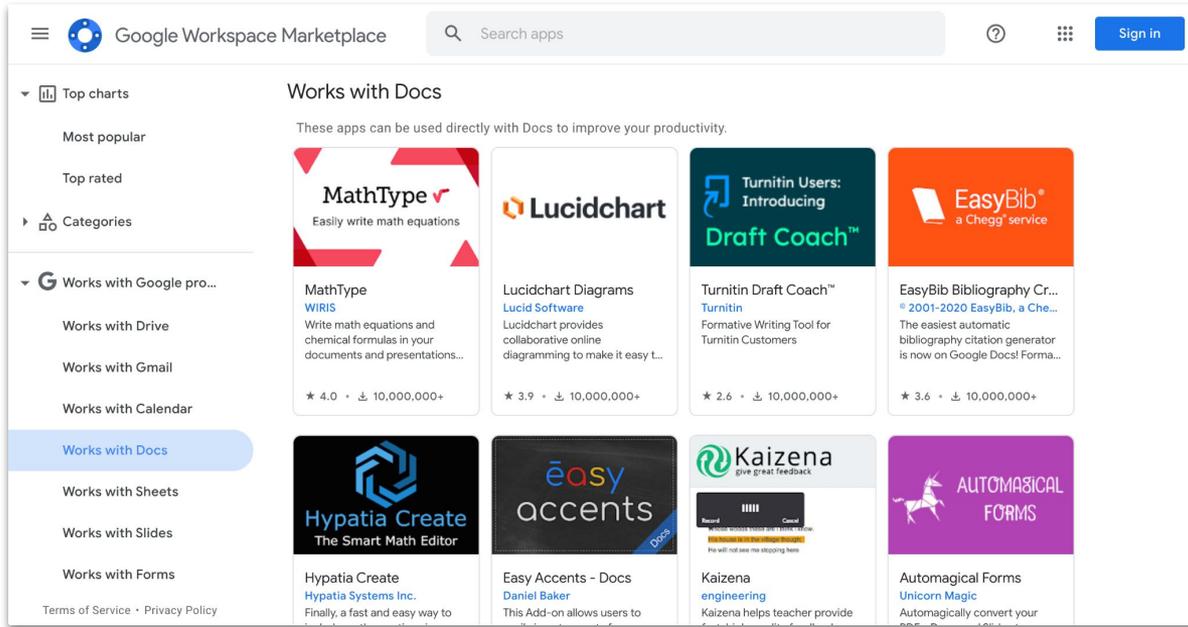


Math Goodies

Automatic math problems based on topic

The majority of existing solutions require manual user input

existing solutions: worksheet generation



Will be available for free to install from Google Workspace Marketplace
*Currently under review by Google

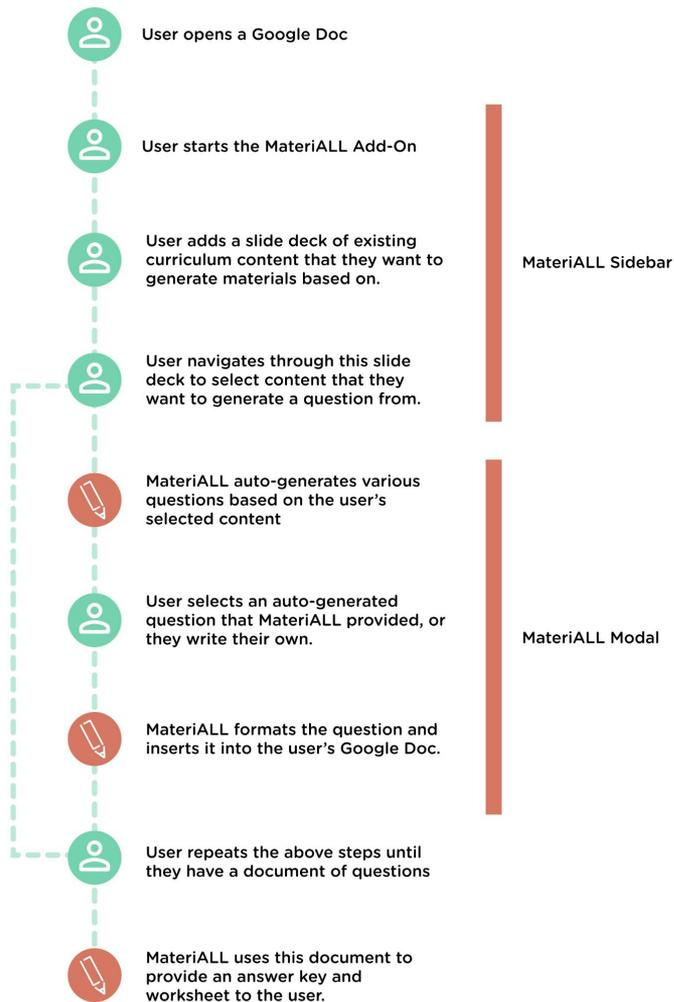
installation

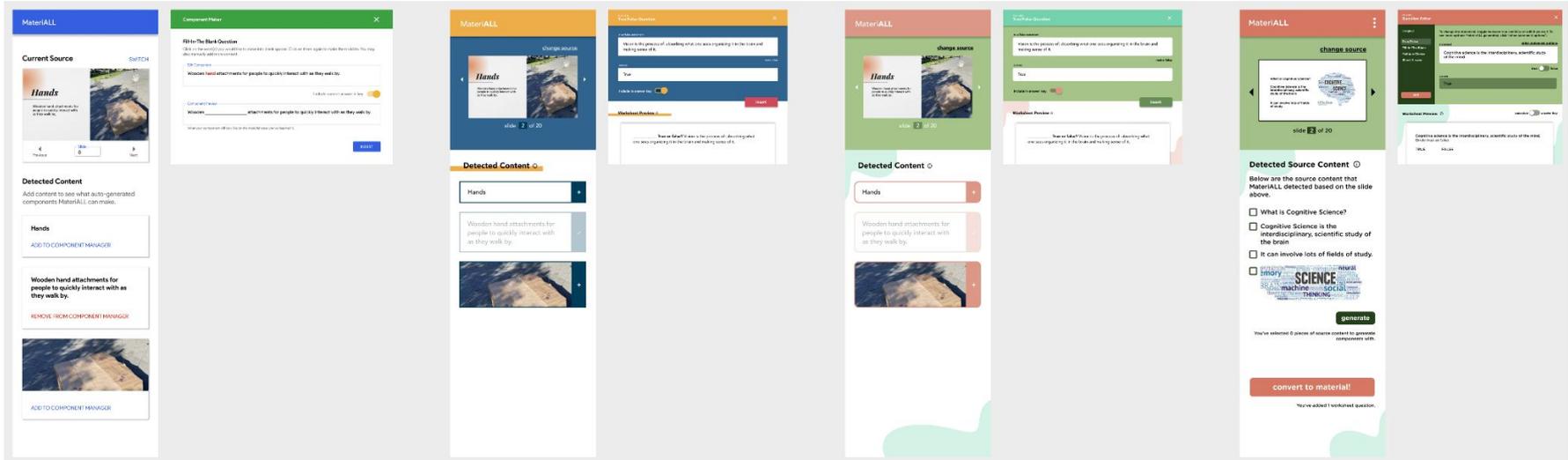


Sidebars for dynamic editing on the Google Doc or Slide. Modals for more detailed, fine-tuned work.

Teachers traverse through the entire Google Drive when lesson planning. Google Add ons can do the same!

user flow





visual design process

True/False

Used WordNet synsets to get antonyms in order to generate false statements

Fill-in-the-Blank

Used spaCy to identify noun chunks, which are used as suggestions for blanks

Multiple Choice

Used Gensim trained on a pruned word2vec sample to find similar words to use as multiple choice options

MateriaLL
Question Editor

Original

To change the statement, toggle between true and false or edit it yourself. To see more options MateriaLL generated, click "other statement options".

statement other statement options

Cognitive science is the interdisciplinary, scientific study of the mind.

true false

answer

True

add

Worksheet Preview

Answer Key Preview

Cognitive science is the interdisciplinary, scientific study of the mind. Circle true or false:

TRUE FALSE

MateriaLL
Question Editor

Original

To change the statement, toggle between true and false or edit it yourself. To see more options MateriaLL generated, click "other statement options".

True/False Question

Auto-Generated Options

False Statements ⓘ

true false

Select the statement for this question, or write your own.

- Cognitive science is the disciplinary, scientific study of the mind.
- Cognitive science is the interdisciplinary, scientific study of the body.
- write your own option

done

TRUE FALSE

true/false questions

MateriALL
Question Editor

Original

To change which words to leave blank, click "edit blanks". To create your own question, edit "statement" box.

statement [edit blanks](#)

_____ is the interdisciplinary, scientific study of the mind.

answer

Cognitive Science

add

Worksheet Preview

Answer Key Preview

_____ is the interdisciplinary, scientific study of the mind.

MateriALL
Question Editor

Original

To change which words to leave blank, click "edit blanks". To create your own question, edit "statement" box.

True/False

Fill-In-The Blank

Multiple Choice

Short Answer

add

Fill-In-The Blank Questions
Auto-Generated Options

Blanks ⓘ

Red, underlined words will be blank once converted. To toggle them blank or not blank, click on words.

Cognitive Science is the interdisciplinary, scientific study of the mind

done

_____ is the interdisciplinary, scientific study of the mind.

fill-in-the blank questions

MateriALL
Question Editor

Original

To make word(s) blank, use "edit options". In "edit options", you can also edit your options, or choose options that MateriALL generates.

True/False

Fill-In-The Blank

Multiple Choice

Short Answer

statement [edit options](#)

Cognitive Science is the interdisciplinary, scientific study of the _____.

options

- a. soul
- b. head
- c. mind
- d. heart

add

Worksheet Preview

Answer Key Preview

Cognitive Science is the interdisciplinary, scientific study of the ____.

- a. soul
- b. head
- c. mind
- d. heart

MateriALL
Question Editor

Original

To make word(s) blank, use "edit options". In "edit options", you can also edit your options, or choose options that MateriALL generates.

True/False

Fill-In-The Blank

Multiple Choice

Short Answer

Multiple Choice Question

Auto-Generated Options

Multiple Choice Options ⓘ

Click on words in the sentence below to generate multiple choice options for. Otherwise, you can write your own options. The red, underlined option will be the correct answer.

Cognitive Science is the interdisciplinary, scientific study of the mind

- mind
- soul
- head
- write your own option

heart

+ add another option

done

multiple choice questions

MateriALL
Question Editor ✕

Original

True/False

Fill-In-The Blank

Multiple Choice

Short Answer

add

To change the question MateriALL generated, edit the question.

question

What is cognitive science the study of?

sample answer

Cognitive Science is the interdisciplinary, scientific study of the mind.

answer space: 2 lines unlined lined

Worksheet Preview ⓘ

Answer Key Preview

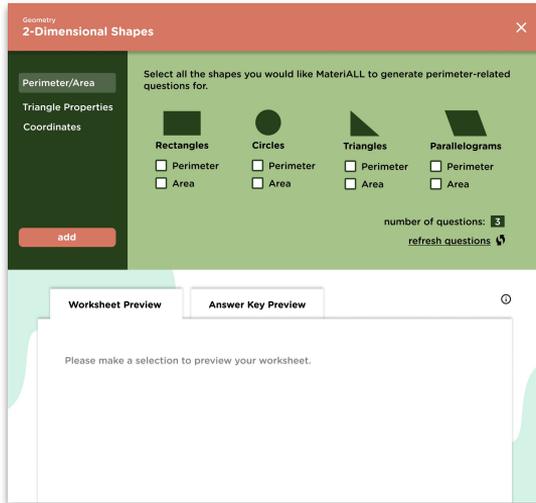
What is cognitive science the study of?

short answer questions



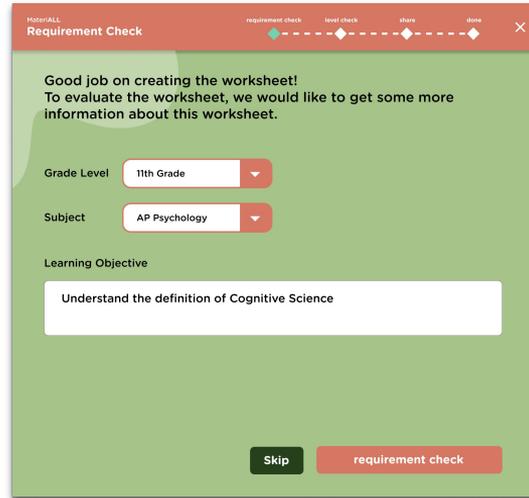
Qualitative: 15 synchronous, remote sessions with K-12th teachers

Quantitative: 54 survey responses from K-12th teachers



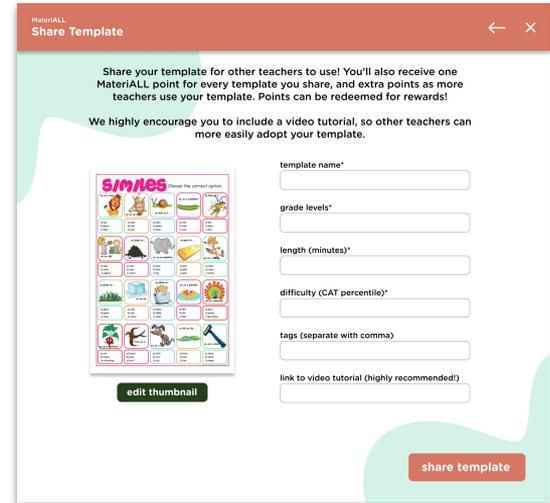
Subject-Specific

Math, physics, and other subjects



Evaluations

Learning objectives and other stakeholders



Templates

Collaboration with other teachers

future product extensions

Limited Sample

Our user research participants were limited to those within our network and social media. We would have liked to recruit a more diverse group of participants.

Google API Constraints

We were limited in functionality based on what was available through Google API. Although we had initially had some more functionality, not all of it is currently feasible in a Google Add-On.

Computing Power

We faced some limitations on computing power due to limited budget. We could not host computing intensive models, like one for generating short answer questions.

Why a Google add-on and not a standalone app?

From our research, teachers don't have the time to learn a new tool. We chose a Google add-on, since Google tools are the most used by teachers.

Why not actually build a tool to address students' socio-emotional needs?

We don't think this is a solution to be automated with technology, which is the skill set of our team. Also, from our research, creating worksheets is very time-consuming and a manual, not enjoyable process. This way teachers can spend time doing something they actually enjoy - spending time with students!

What if teachers don't have slides prepared?

Many teachers already have prepared slides! And if they don't, MateriALL is meant to reduce redundant work, so they only need to make the deck and the rest of the materials will come quicker. If they don't normally use slides and normally use something else (textbook, whiteboard, etc.), that's out of scope and not our target user in the use case we designed for. But it's a future product extension we thought about!