Volume Check

audio test
MateriALL
auto-generated classroom materials
meet the team

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UX Research

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Software Engineering

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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

Our process
our process

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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

- Less than 5 years
  - setting up learning objectives
  - creating slides
  - creating worksheets
  - creating exams
  - matching to state or district standards

- 5-10 years
  - creating worksheets

- More than 10 years

Further scoping
Digital Tools for Preparing Lessons and Materials

- Google Slides
- Google Sheets
- Google Docs
- Kahoot!
- Microsoft PowerPoint
- Microsoft Word
- Microsoft Excel
Design
Low, mid, and high fidelity screens

User Feedback
Concept testing and usability testing

Development
Google Apps Script and API
A Google Docs Add-on that uses teachers’ existing slide decks to generate questions and format worksheets.

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

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.
how it works

User-Facing

1. Load slide deck into MateriALL
2. User selects content from slide deck
3. User selects which question to insert

Back End

MateriALL's NLP tech generates questions for selected content
how it works

User-Facing

1. Load slide deck into MateriALL
2. User selects content from slide deck
3. User selects which question to insert
4. User makes their own edits.
5. User repeats the previous steps until satisfied
6. User receives a classroom-ready material!

Back End

- MateriALL's NLP tech generates questions for selected content
- MateriALL formats the question and adds it to the Google Doc.
- MateriALL creates answer sheet and worksheet
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!**
Appendix
existing solutions: pre-existing activities

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”
The majority of existing solutions require manual user input

**Canva**
Beautiful worksheet templates

**TEFL.NET**
Diverse activities for young students

**Math Goodies**
Automatic math problems based on topic
Will be available for free to install from Google Workspace Marketplace

*Currently under review by Google
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**

1. User opens a Google Doc
2. User starts the MateriALL Add-On
3. User adds a slide deck of existing curriculum content that they want to generate materials based on.
4. User navigates through this slide deck to select content that they want to generate a question from.
5. MateriALL auto-generates various questions based on the user's selected content.
6. User selects an auto-generated question that MateriALL provided, or they write their own.
7. MateriALL formats the question and inserts it into the user's Google Doc.
8. User repeats the above steps until they have a document of questions.
9. MateriALL uses this document to provide an answer key and worksheet to the user.
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
Cognitive science is the interdisciplinary, scientific study of the mind.

Circle true or false:

TRUE       FALSE
Cognitive Science is the interdisciplinary, scientific study of the mind.
Cognitive Science is the interdisciplinary, scientific study of the _______.

a. soul  
b. head  
c. mind  
d. heart
What is cognitive science the study of?

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