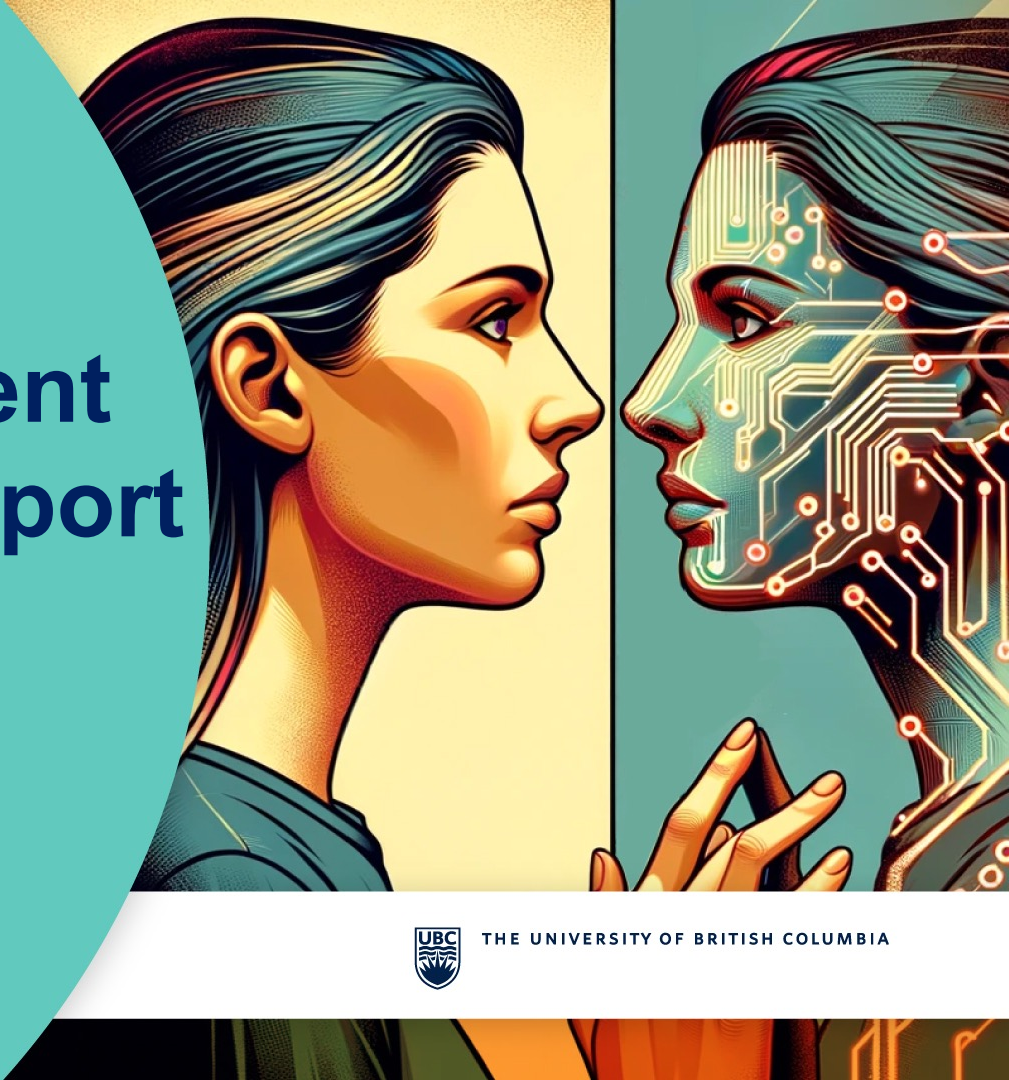


**CELEBRATE  
LEARNING  
WEEK**

# Using AI for Student Learning and Support

**Ramon Lawrence**  
Academic Director, CTL, UBCO



THE UNIVERSITY OF BRITISH COLUMBIA

*We respectfully acknowledge the Syilx Okanagan Nation and their peoples, in whose traditional, ancestral, unceded territory UBC Okanagan is situated.*



*We acknowledge that the UBC Vancouver Campus is situated on the traditional, ancestral and unceded territory of the xʷməθkʷəy̓əm (Musqueam).*



# Respectful Environment

*Promoting positive and inclusive discourse for all in the UBC community*

**The University of British Columbia envisions a climate in which students, faculty and staff are provided with the best possible conditions for learning, researching and working, including an environment that is dedicated to excellence, equity and mutual respect.**

**The University of British Columbia strives to realize this vision by establishing employment and educational practices that respect the dignity of individuals and make it possible for everyone to live, work and study in a positive and supportive environment, free from harmful behaviours such as bullying and harassment.**

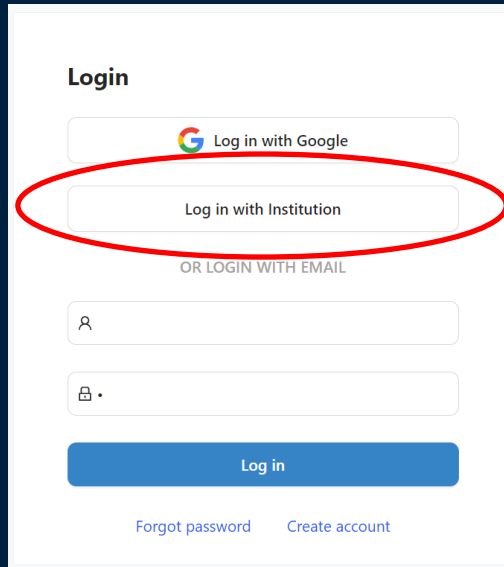
[Read more about UBC's respectful environment statement](#)

# Getting Help

May raise virtual hand or post in chat OR  
Try virtual help support system:

<https://coursehelp.ubc.ca/course/8/invite?code=clw>

CWL login:



The screenshot shows a login interface with the following elements:

- Login** header
- Buttons for "Log in with Google" and "Log in with Institution". The "Log in with Institution" button is circled in red.
- Text: "OR LOGIN WITH EMAIL"
- Input fields for username and password.
- A blue "Log in" button.
- Links for "Forgot password" and "Create account" at the bottom.





CLW

Queue

Schedule

Admin Panel

Insights

My Courses >

## CLW Help Centre

↻ Check In

You are a **Professor** for this course

Online

0 in queue



0 staff checked in

🔔 [Join this queue for all help](#)



Async Question Centre



Ask your questions any time!

### Course chatbot



Hello, how can I assist you? I can help with anything course related.

What is HelpMe system?



The HelpMe system is a tool that supports both in-person and virtual help sessions for students seeking assistance with assignments. It encourages efficiency in code sharing and review, with a maximum session time of 15 minutes. Students are instructed to re-queue if more help is needed, and TAs focus on quick, focused help to promote independent learning. The system has resulted in high student satisfaction and a shift towards synchronous help sessions over asynchronous email communication. It also allows for improved feedback and code reviews, potentially leading to a slight positive impact on student performance.

HelpMe\_final

p. 6

p. 5

p. 2

# Outline

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Introductions and Learning Objectives (10 min)

Try it: Evaluating Quality of AI Responses (10 min)

AI Tools for Students and AI Detection (10 min)

Retrieval-augmented generation: Databases and AI (10 min)

Course-specific chatbots for student support (10 min)

Q&A and Discussions

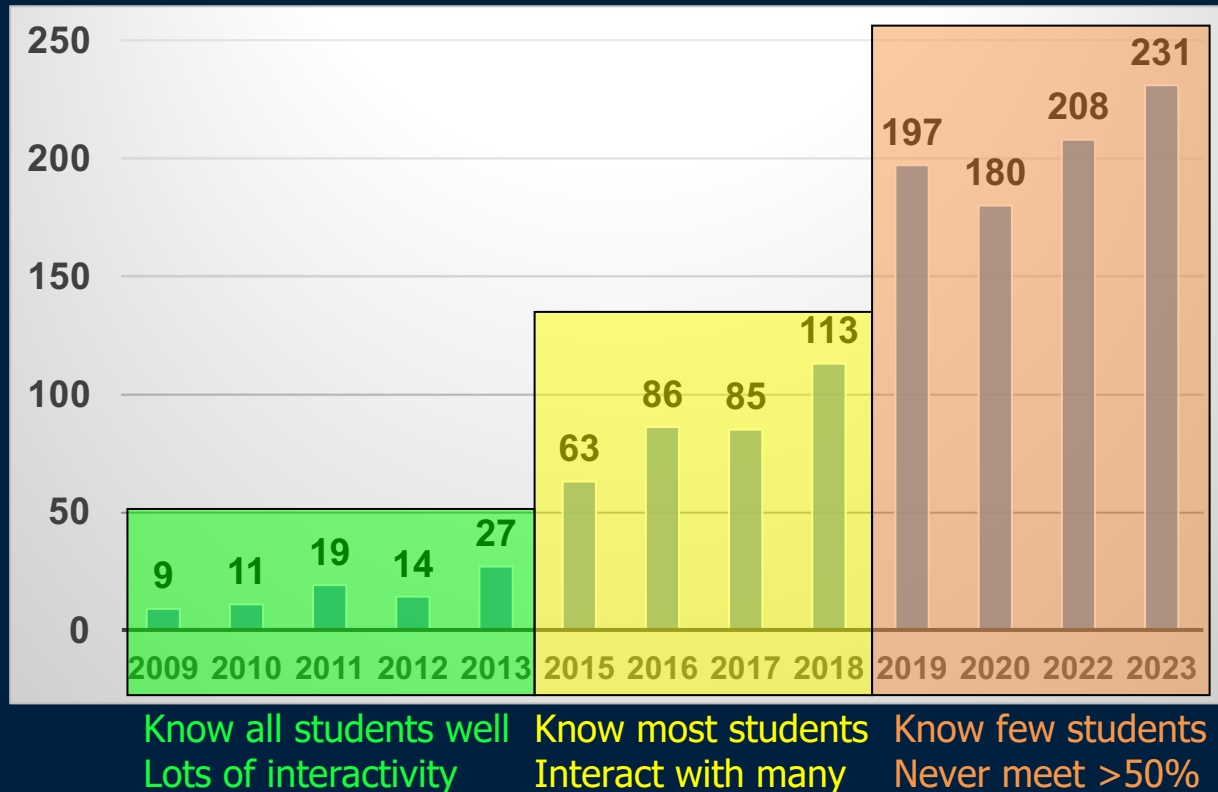
# Learning Objectives

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- 1) Understand limits of AI and importance of validating AI responses.
- 2) Review common student usage of AI and issues in detection.
- 3) Evaluate differences between databases and AI, and explain the impact on accuracy and bias.
- 4) Discuss how course-specific chatbots may impact student help.



# Motivation: Students in My Database Course



# Try it: Evaluating Quality of AI Responses

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Using a (free) generative AI tool:

- Microsoft Copilot (<https://copilot.microsoft.com/>)
- OpenAI ChatGPT - <https://chatgpt.com/>

Ask one or more realistic questions from your course or work.

- No personal or sensitive information

Post question, AI answer, and your score out of 5 here:

<https://jamboard.google.com/d/1zSWpH4mVil4qQfRplwrhPtN65A40D5ZQe--2mgqvmjM/edit?usp=sharing>

Review others' work to find any patterns.

# AI Tools for Students

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Many research studies show students are actively using AI tools.

**Does not matter if university/instructor allows AI or not.**

General AI: OpenAI ChatGPT (v3.5 free, v4 \$20/month), Microsoft Copilot, Google Gemini, Claude, PopAI.pro

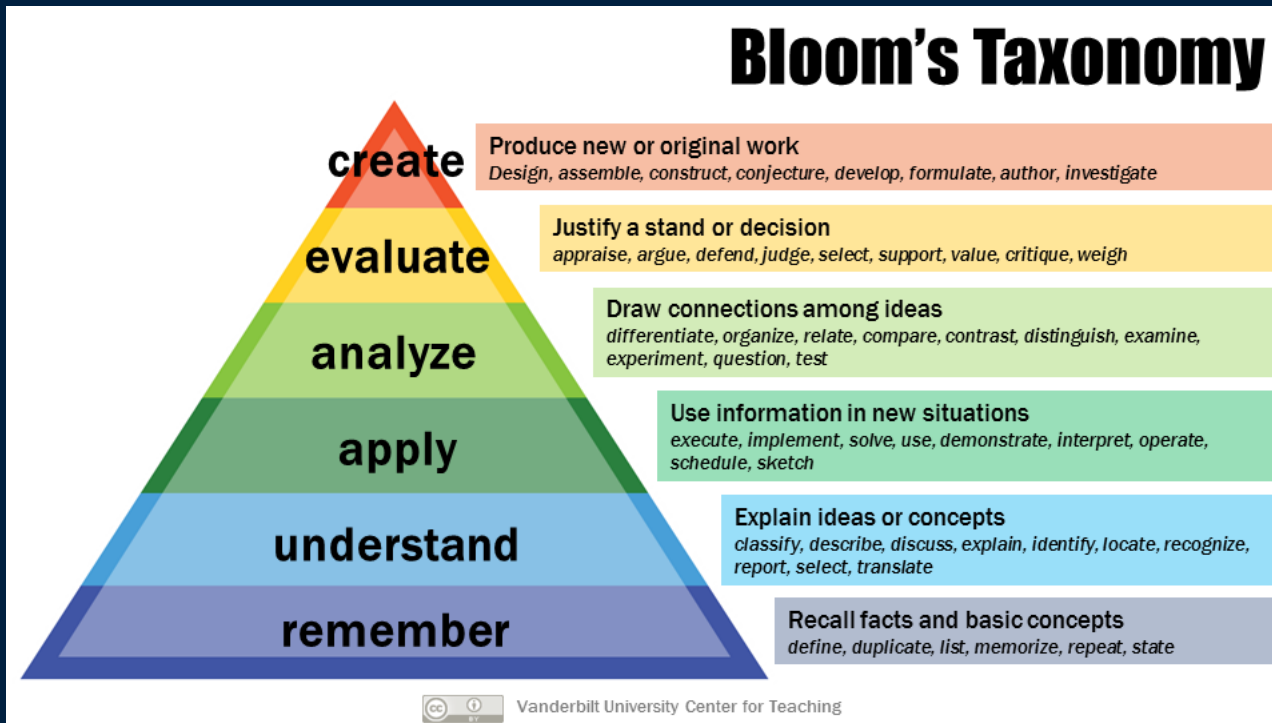
Images: DALL-E, Adobe Firefly

Writing: Grammarly (\$15/month), Quillbot

For instructors: Eduaide.Ai

# How Does AI change Assessment?

Technology and AI allow students to outperform their abilities on assessments that are not resilient to their use.



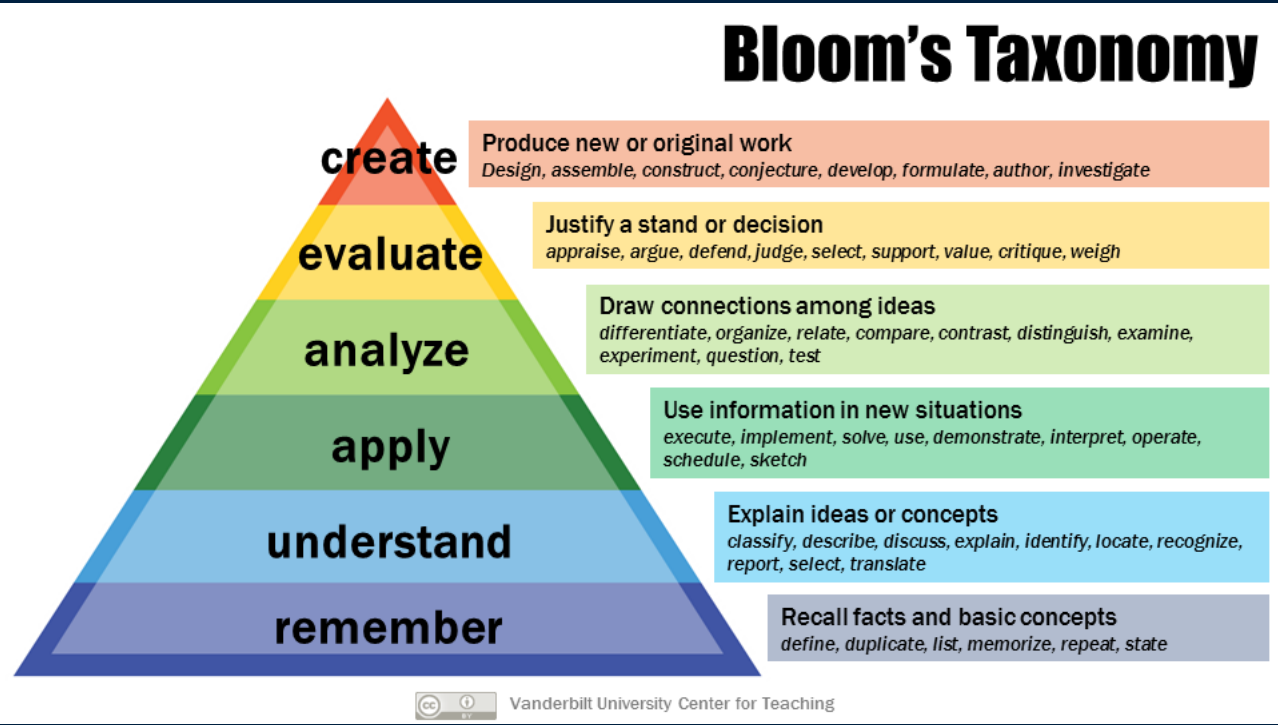
} Generative AI, ChatGPT

} Web forums, Chegg, WolframAlpha

} Internet, Google

# How Does Technology change Learning Outcomes?

Learning outcomes should evolve with technology as well as the assessments. *Does a student really need to remember all these facts?*

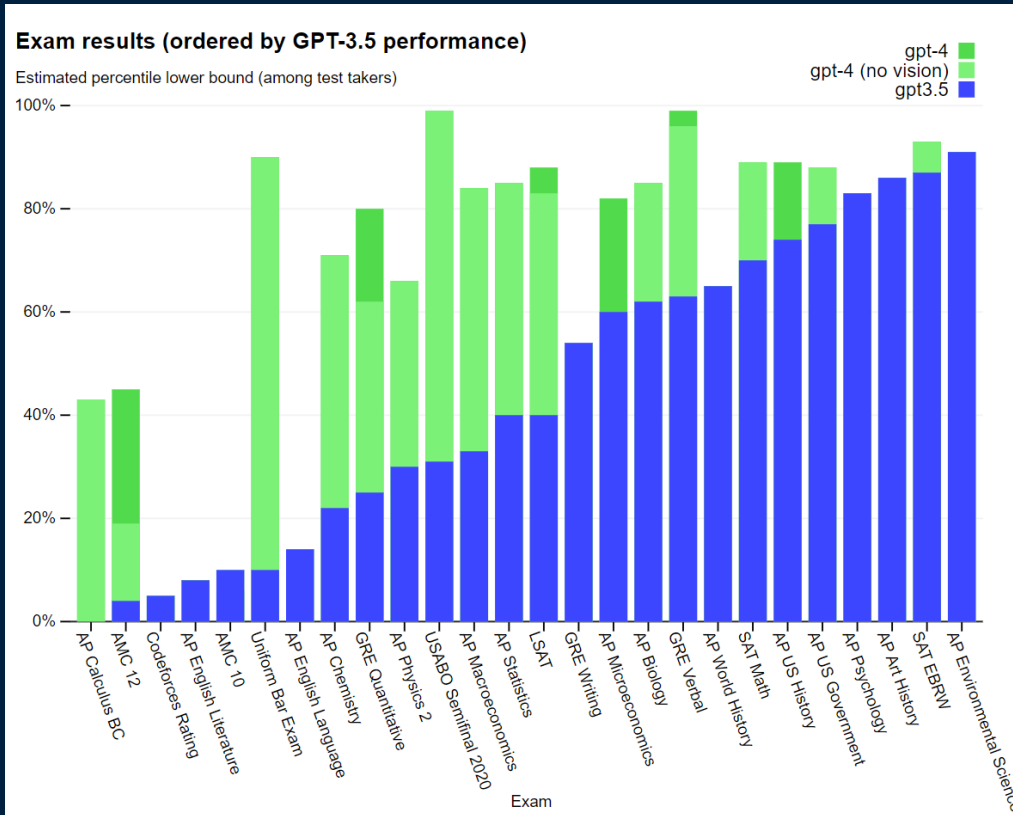


Generative AI can produce new material/insights. How does that change the skills the student needs for the job?

Digital assistants can suggest next actions based on prior experience. Improves work efficiency

Fact recall is replaced with Internet searches.

# Assessment Resilience to AI



Source: OpenAI - <https://openai.com/research/gpt-4>

# ChatGPT Performance Databases

Subject	Grade
Relational Algebra	100
Creating tables	100
Writing SQL queries	100
UML Modeling	0
Converting UML Diagrams	0
Database and programming	100
Building a Database-enabled Web Site	85
Images, Security, and Transactions	100
XML, JSON, Views, and Triggers	100
Final project with database	90
midterm1	95
midterm2	57

Diagrams and require interactive building on PrairieLearn

# Detecting AI Content

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Mixed results for computer and human detection of AI generated content.

OpenAI's announcement on its AI detector: “As of July 20, 2023, the AI classifier is no longer available due to its low rate of accuracy.”

Similarity detection (such as Turnitin) uses different approach than AI detection that uses characteristics of content.

AI detection is harder as characteristics are not as universal between AI systems, prompts, and users.



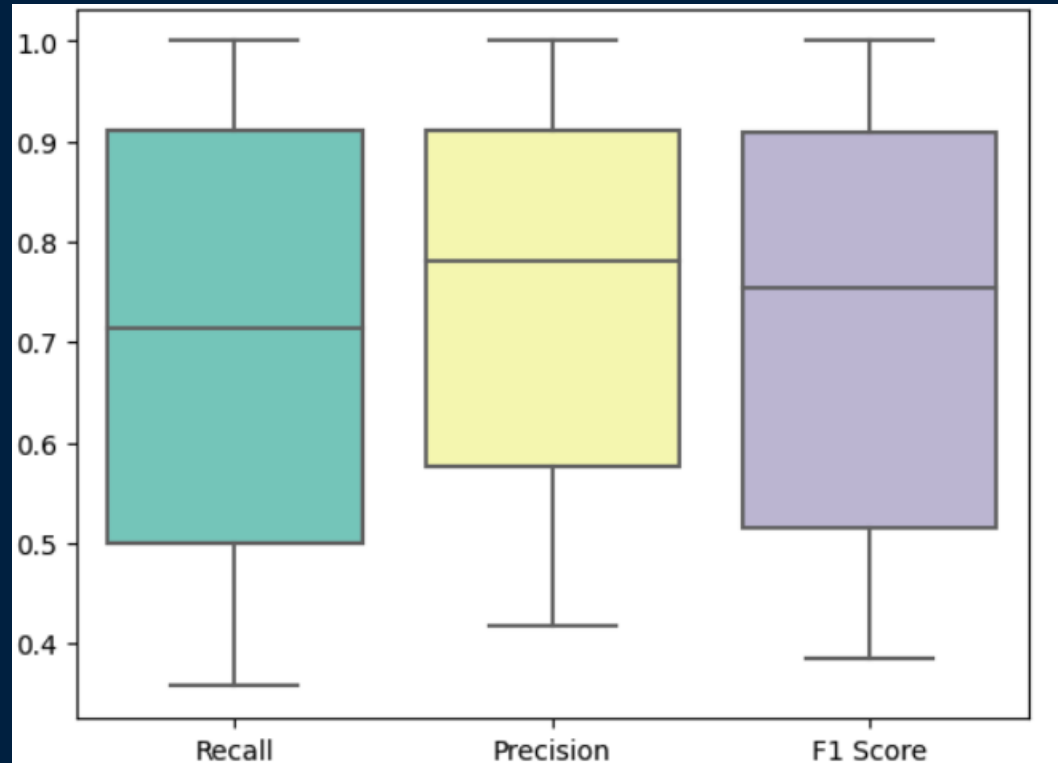
# Human Detection of AI Assignments

Highly variable:

- Avg. recall: 69%
- Avg. precision: 74%
- Avg. F1 score: 71%
- Detection accuracy: 69%
- False positives: 22%

TA and Instructor heuristics:

- Grammar
- Styling and formatting
- Overly advanced solution



# AI Detection

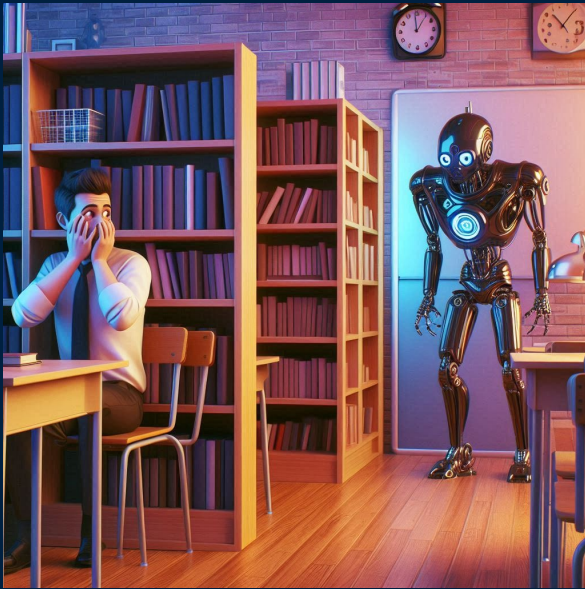
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AI detection as a prevention mechanism will continue to get harder as AI is integrated into software such as Word and Google Docs (e.g. Grammarly).

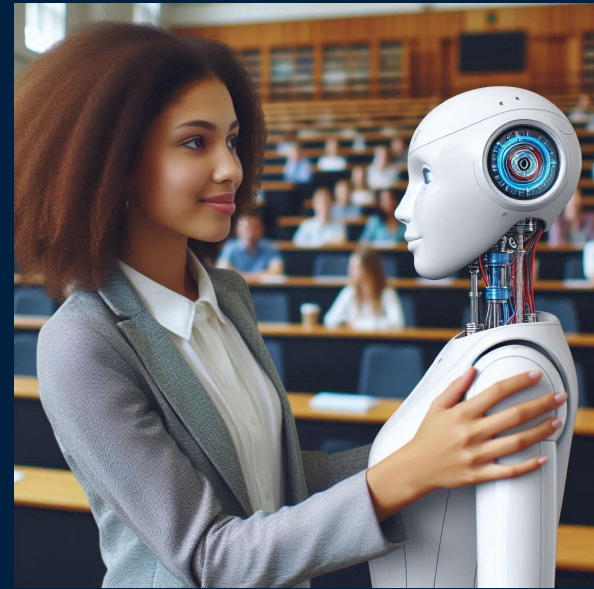
How would you check if a student used spelling/grammar support currently built-in?

Would you prevent them from using that?

# Insights with AI Generated Images



Do not hide from AI.  
(It is not going away.)



Face and embrace AI.  
(Your students have)

# Databases vs AI

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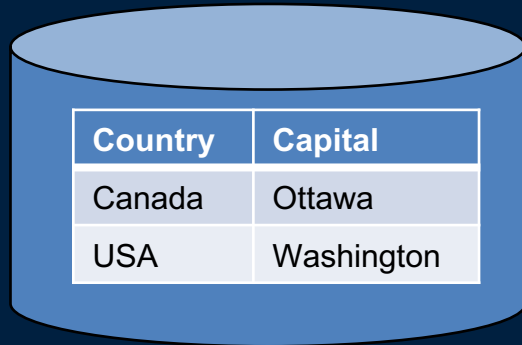
A **database system** allows for efficient storage and retrieval of data.

**Generative AI** refers to a class of artificial intelligence algorithms and models that are used to generate new content, such as images, text, audio, and video, that is similar to the data it has been trained on. These models learn the underlying patterns and structures of the data and can then generate new, realistic-looking content.

*(source: ChatGPT v3.5)*

# Database vs Generative AI

Database

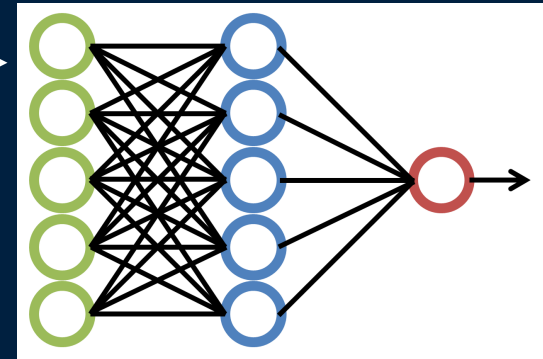


What is the capital of Canada?

Capital of Canada is Ottawa.

Toronto is capital of Canada.

Generative AI

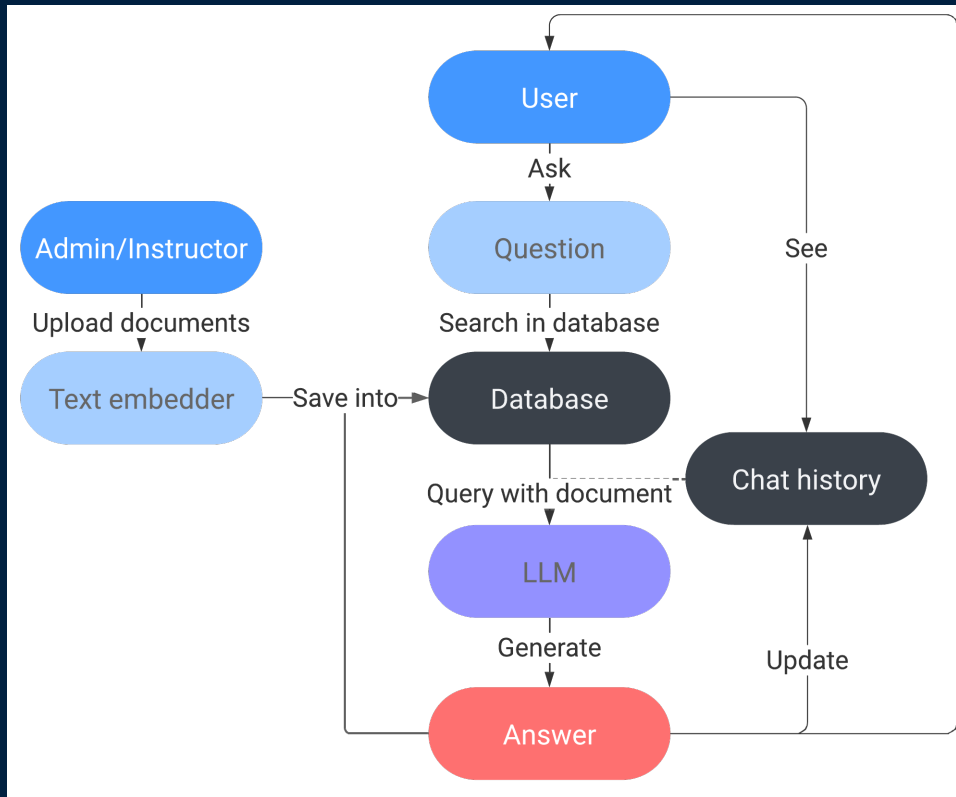


What is the capital of Canada?

**Hallucination** – model generates incorrect information

**Bias** – systematic errors/views in model output from data, training, and use

# RAG Chatbot Architecture



**Retrieval-augmented generation (RAG)** enhances generative AI accuracy with external data.

Without RAG, course-specific answers not possible (deadlines, administration, specific content).

# Office Hours and Student Support

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Benefits to out of class student-instructor interactions: increased retention, higher student satisfaction and confidence, and positive impact on student outcomes.

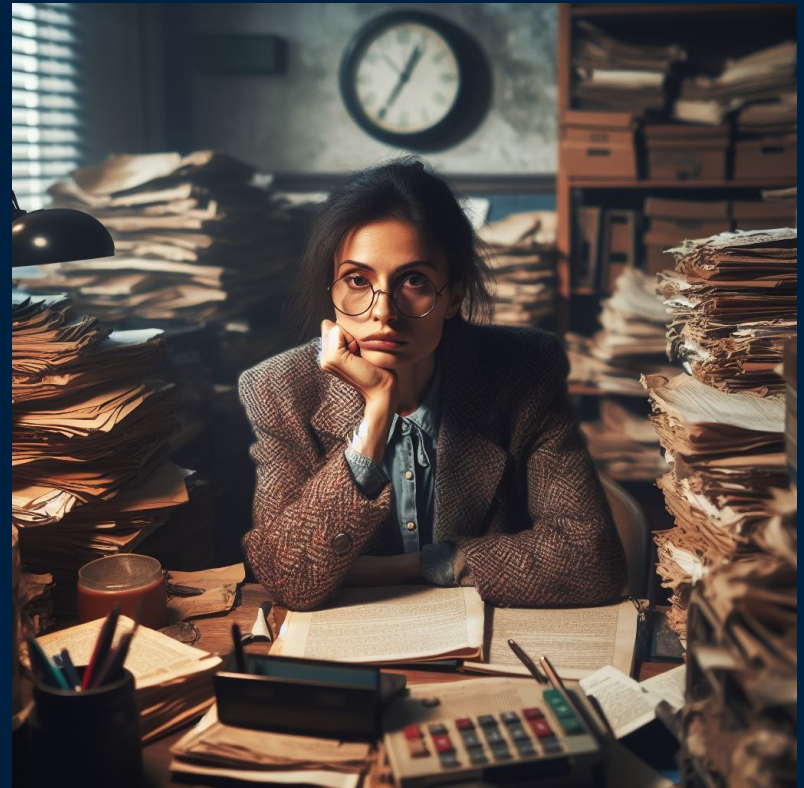
Office hours are often underutilized, unequally accessed, and used as a last resort.

Students prefer web search, AI answers, or email to instructor.

How many emails do you receive?

Is that how you want to interact with students?

# What are Your Office Hours Like?





# Course-specific Chatbots for Student Support

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## Goals:

- 1) UBC-approved chatbot providing real-time answers to student questions.
- 2) Analyze how students interact with generative AI to better support their learning and improve instructor efficiency.

## Other possible tools:

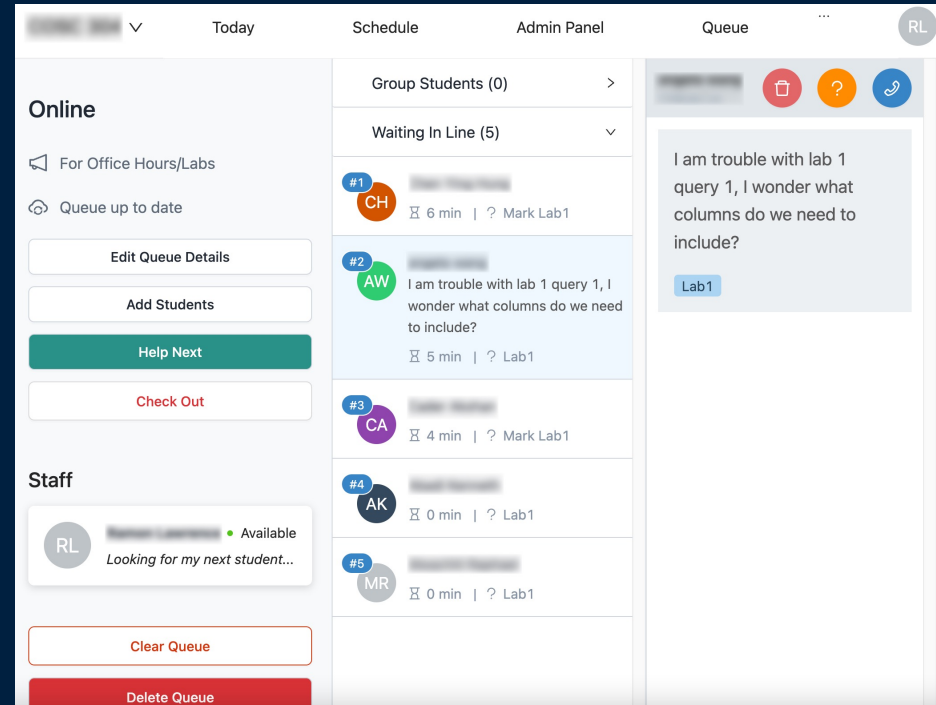
- Create custom GPTs (requires paid GPTv4)
- Poe

# HelpMe Student Support System

**Goal:** Help students efficiently and reduce emails

**HelpMe** is a multi-channel support system:

- online queue providing visibility, fairness, efficiency, and reduced waiting
- asynchronous questions with AI-generated answers
- course-specific chatbot
- question categories and analytics



# Why Develop Own Software at UBC?

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- 1) Ability to customize software to specific needs
- 2) Freedom from vendor control and limitations
- 3) Engineer to support UBC standards on privacy, security, and IP
- 4) Flexibility to ask research questions to explore ideas
- 5) Reduced cost and limited chance of vendor lock-in

# Instructional Environment

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Upper-level elective computer science course in database systems

99 undergrad and 8 grad students. All third year or above.

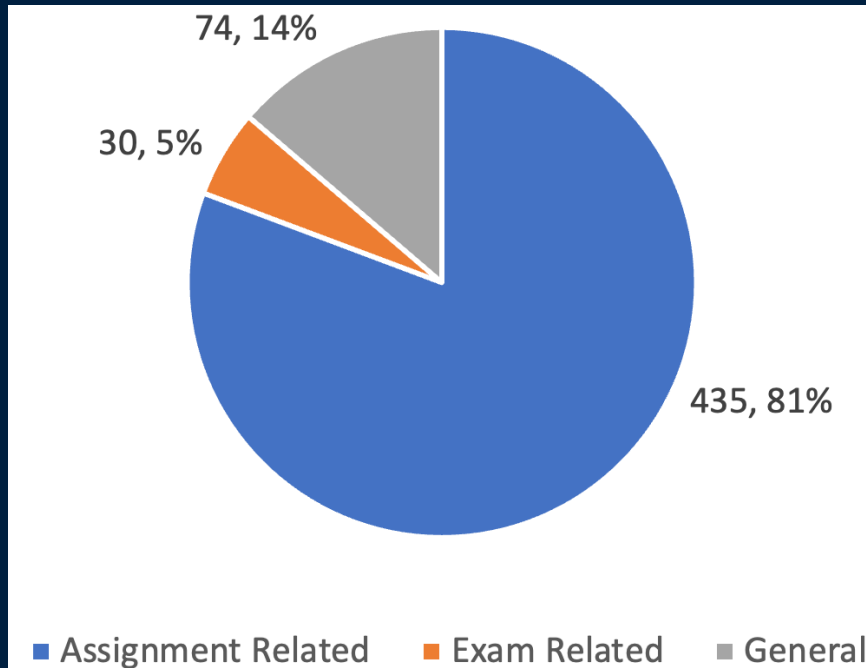
Two-hour virtual help sessions from 2 to 4 pm every weekday.  
Two TAs each covered two sessions other by the instructor.

No scheduled lab time.

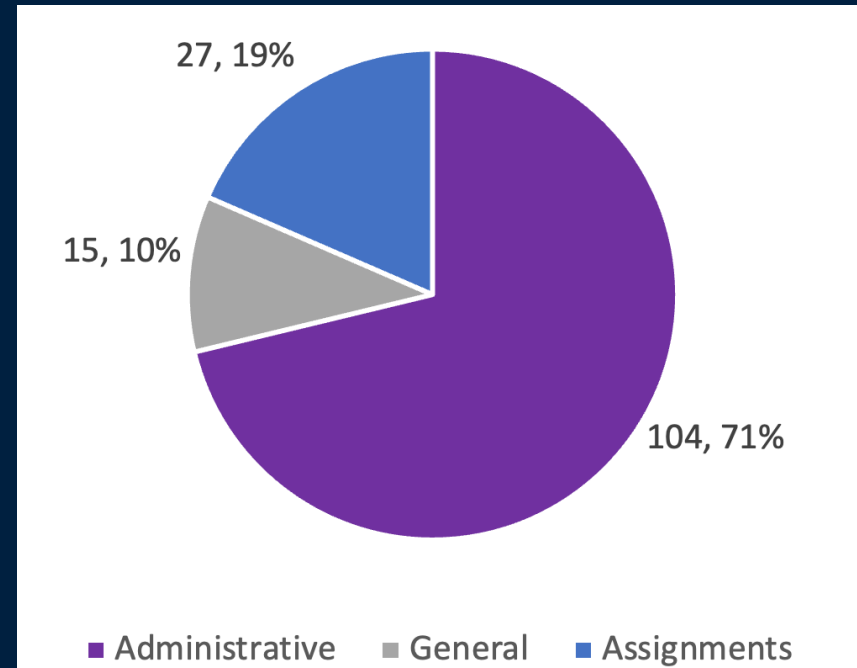
Weekly assignments students complete on their own time.

The instructor was accessible by email. TAs were not accessible by email by university policy.

# Results: Help Session Utilization

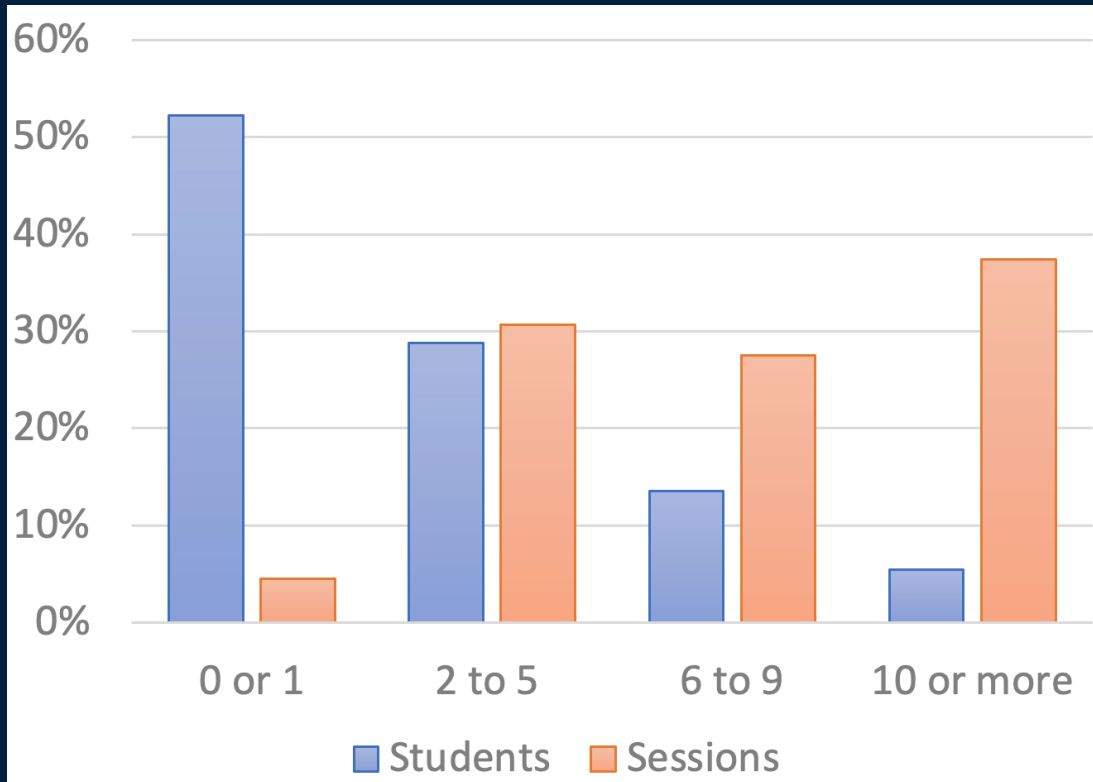


Help Session Question Categories



Email Question Categories

# Results: Student Engagement



Large variance in help session engagement.

19% of students had 64% of total sessions.  
*(power users)*

54% of students had only 4% of sessions.  
*(no shows)*

# Results: Student Help Seeking Impact

	Before	After
Office Hours	24%	10%
Email	<b>42%</b>	<b>16%</b>
Did not seek help	22%	10%
After class	12%	0%
Office Hours with HelpMe	N/A	<b>63%</b>

Preferred help seeking method before and after using HelpMe

# Results: Student Comments

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*“Quick, easy, simple. No commute, got my questions answered and went on with my day.”*

Students are selective on the type of questions asked and how frequently they engage with help sessions.

The perceived benefit must be much greater than the time involved.

Visibility and expected wait times were major factors for students.

- Allowed for dynamic TA management for surge times



# Results: Office Hours versus Email

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HelpMe system limited email volumes to instructor.

Students ask different questions through email.

Emails are often personal and student-specific relating to missed deadlines and classes, illness, accommodations, or performance on exams and assessments.

The asynchronous and impersonal aspect of email makes it easier for students to communicate difficult subjects.

# Chatbots

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A generative AI chatbot with course-specific content may further reduce communications when the answer is already in the materials.

Course-specific chatbot accessible by:

- Communicating directly with chatbot
- Posting asynchronous question

How will this impact student help seeking?

# Chat Interface

CS304 chatbot
Close

Hello, how can I assist you?

What are the major components of this course?

The major components of this course include creating and querying databases, programming with databases, developing applications and websites, and performing data analysis.

304\_1\_Intro

p. 3

p. 7

p. 13

304\_25\_Course\_Summary

p. 1

Ask something...

Ask

What are the algorithms discussed in this course?

The algorithms discussed in this course include selection, projection, join, sorting, hashing, and indexing algorithms. These algorithms are used to implement relational algebra operators and optimize query processing based on database characteristics.

COSC 404 Query Processing

p. 13

p. 135

p. 134

COSC 404 - Introduction

p. 3

Can you explain one of those algorithms?

One of the algorithms discussed in this course is the hash-join algorithm. It is used for joining two relations based on a common attribute by partitioning the data into buckets using a hash function.

COSC 404 Query Processing


p. 14

p. 135

p. 13

p. 134

# Question Interface

 COSC 360 Schedule My Courses > JJ

### Asynchronous question center

Post your Question

### Filter Questions

Verification status ▼Visibility ▼All Questions ▼Select question types

Sort By Newest ▼

JJ Jeff Jefferson

AI Answered, Resolved

1hr 9min

**Databases**

How do I connect to the database with PHP

0 **Answer:**

To connect to the database with PHP, you need to use the mysqli API. You can find the credentials for connecting to the database in the example code provided. Make sure to establish a connection using the parameters \$host, \$database, \$user, and \$password. Access the database using the mysqli API to interact with it and perform operations like querying and updating data. Remember to handle data securely, especially when dealing with sensitive information like passwords.

Other

^

Anonymous Student

Answered by Human

80hr 19min

**Lab 1**

3 Lab1

v

^

Anonymous Student

Answered by Human

79hr 31min

**What is the midterm format?**

2 Exams

v

# Asking a Question

## Filter Questions

Verification status

Visibility

All Questions

Select question types

## Sort By

Newest

JS

Justin Schultz

Answered by AI

1hr 2min



### Lab 1

What is lab 1 about



### Answer:



Lab 1 is about exploring the basics of PHP, understanding the basic building blocks of the PHP language, and working with server-side scripting. It involves a series of exercises to familiarize students with PHP and converting an HTML file into a PHP file to develop PHP skills. Students need to use a webserver to host their page for this lab.



Lab1

Satisfied

Still need faculty Help

# Answering a Question

Post/Edit response to Student question ✕

**Question:**

**Lab 1**  
What is lab 1 about


**Response:**

Set question visible to all students:  visible

Mark as verified by faculty:  verified

Lab 1 is about exploring the basics of PHP, understanding the basic building blocks of the PHP language, and working with server-side scripting. It involves a series of exercises to familiarize students with PHP and converting an HTML file into a PHP file to develop PHP skills. Students need to use a webserver to host their page for this lab.

# Verified Questions

 **COSC 360**   Schedule   My Courses > JJ


### Asynchronous question center

Post your Question

### Filter Questions

Verification status Visibility All Questions Select question types

Sort By

 *Jeff Jefferson*AI Answered, Resolved1hr 9min

**Databases**

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Other

*Anonymous Student*Answered by Human80hr 19min

**Lab 1**

3 Lab1

*Anonymous Student*Answered by Human79hr 31min

**What is the midterm format?**

2 Exams

# Summary – AI and Student Help





# Next Steps

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Early adopters to help determine:

- Use case for course-specific chatbots
- Key features for instructors at UBC
- Recommendations

Looking for courses in summer and fall terms to pilot technology.



THE UNIVERSITY OF BRITISH COLUMBIA

*Thank You!*

HelpMe on GitHub



Try HelpMe Now

