

The application to be developed is a Web-based tool that is designed to allow students to send questions to their instructor during class from a classroom, computer station, laptop or mobile device. The application presents a system for students to send questions to a central 'bin', which the instructor will open and review periodically during the class, while preserving anonymity for each individual student, in that other students in the class cannot determine which student asked which specific question, or even how many questions any given student has asked.

This application will be used in a future research study investigating if access to such a tool can be shown to increase the frequency of in-class questions from students, or any measurable impacts derived from using such an application in class, compared to students without access to this application with the same course/instructor.

The application will be based on a real-time chat system, so will be readily familiar to most students and present a very simple interface. Two-way or group chat functionality will not be a feature of this application, as it is designed for students to send questions/messages one-way to the instructor during class, and not for the instructor to respond to each student or for students to interact with other students in class (or even see what any other student has submitted).

#### **Sample Use Case:**

- (1) At the start of a class, a student **logs in** to the 'sender' version of the chat application using **FOL username** (on either a desktop or mobile device). A chat form appears, but this screen does NOT show a record of conversations like a normal chat app, as it is a one-way communication application. When the student submits a question/comment, their screen will show their question and a 'question sent' indication, but that is all.
- (2) On the instructor side, the student's question appears in a 'receiver' window that has the following features:
  - a. The receiver window will be collapsed by default to display just a small widget-like tab, showing a counter for the number of questions submitted since the last time it was opened. Clicking anywhere on this tab will expand the window to show the list of submitted questions, newest to oldest.
  - b. Questions show **without identifying information** from the sender as the **default** state. A 'show sender' link/button is available for each message that can show/hide the sender's FOL username at the instructor's discretion (there should be a confirm message 'are you sure you want to view sender?' to make sure the sender's username can't be easily displayed by accident.) This is to maintain **anonymity** to the class but demonstrate to the students that messages are **not** in fact anonymous to the professor, and thereby allow the question window to be displayed on shared screens without any identifying information.

- (3) The counter will count up to a predetermined number of questions (e.g., 10), at which point the widget will change colour or otherwise indicate that the 'question bin' is full. The value set as the 'filled' number should be **changeable** by the instructor at any time. (This is designed to avoid the situation where too many questions pile up without the instructor responding, but gives the instructor the ability to adjust to their preferred number.) Once the preset limit has been reached, the 'sender' window should **deactivate** for all students to prevent additional submissions until the instructor reviews the pending questions.
- (4) The instructor can then click on the widget to **expand** the question list (in the anonymous state by default). The window should expand just enough to display the latest set of 10 questions. The questions will be **bolded**, like new email messages, if they have not been addressed, and previous sets of questions can be viewed by scrolling in the window. The instructor can click to **highlight** each question to indicate the topic under discussion; when it has been addressed, the instructor can double-click the item (or click a 'done' button next to it) to indicate it has been read and answered (bold changes to normal type, or colour to green etc.). clicking on the top tab area will **collapse** the question window again. Collapsing the window will **save** the content for the last set of questions, and **unlock** the sender form to students for further use in class.

#### **Additional Core Features:**

- 1 One section of a permanent data store will hold **student information** for logging in (the FOL username). A second **random identifier** (number) will be automatically generated for each student when they are added, but this is not viewable by the instructor at any point, and ideally should be hashed like a password; this is so that for the research study to be conducted, researchers can assure students and the research ethics committee that students real identities cannot be tied to a specific question when looking at the stored data over time.
- 2 Students need to be able to be added to the database in **bulk** (e.g., from a JSON file).
- 3 Instructors also need an **account/profile** that allows them to log in at the start of a class, this will identify both the instructor and the course/section being taught. Instructors cannot access all areas of the content, but should be able to set up their own information and to add students.
- 4 All **questions**, along with the date/time, an indicator if it was answered or not in class or was set to 'off topic', the course/section, the instructor ID, and the student's random identifier (not FOL username), are **saved** in a permanent data store, triggered (possibly) each time the window is re-collapsed. This will allow for more detailed, but anonymized, summary analysis of the number of questions per class, per student, etc.
- 5 Summary **charts and visualizations** can be accessed by the instructor or any admin user, displaying summary information such as:
  - a. Total number of questions graphed over time;
  - b. Percentage of questions answered, off topic, unanswered per class;
  - c. Number of questions submitted per student over time;

- d. A listing of just the question **content** without any student identifiers. This allows for review of the types of questions asked, re-occurring topic words, etc. to indicate patterns about certain content generating the most questions.

Collapsed Widget View:

+ click to expand	8/10 (80%)
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Expanded (click to reveal sender, mark as off-topic, done/answered), current topic highlighted by instructor for emphasis:

+ click to collapse

8/10 (80%)

1 What is Why? 3:21 PM

[Sender](#)

[Off-topic](#)

[Done](#)

2 Is Javascript Magic? 3:31 PM

[Sender](#)

[Off-topic](#)

[Done](#)

...

Student Send View (viewing only questions sent by this student):

Course: MMED 1024    Instructor: R. Haaf    Date: Feb 23<sup>rd</sup>

**3 Previous Question?**    3:21 PM    *message sent!*

*Message bin is full! Please wait until the instructor discusses pending questions before submitting.*

Current Question...

send

### Optional Features:

- (1) The ability for an instructor to add a set of **keywords** prior to each class, indicating the main topics for that class; When viewing the summary statistics, the application can search the saved question text content for occurrences of each keyword. This can flag the most discussed topics as well as deriving a measure of the 'topicality' of the questions asked during the class.
- (2) A related feature would be the ability to add **additional keywords** when the instructor is reviewing the questions, to flag potentially 'troublesome' topics that came up with any frequency that weren't predicted in the keywords added before the class.