

“APPRISE” Student Notification iOS APP

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Abstract

“Apprise” is a mobile application that is intended for teachers in higher education, designed by students. The main purpose of this application is to give teachers an additional tool that will help notify students of important dates or other critical situations (class canceled, extensions to assignments, changes in the exam review, etc.). Studies show that students don’t always read emails and are selective with the time of day that they chose to open their emails. Additionally, communication tools such as group messaging are becoming increasingly popular amongst newer generation students (ages 19 - 29), over the conventional methods that have been widely used in the past such as emails. “Apprise” attempts to close this gap of miscommunication by providing a real-time chat room for individual classrooms, giving teachers and students the ability to communicate effectively and securely in an environment that students are more likely to engage in.

1 Introduction

Many communication methods are currently being utilized by professors to more efficiently engage with their students. These methods include text messaging, social media platforms, and group messaging services. An increase in popularity to use these methods is due to students responding and engaging at higher rates compared to the conventional method of emailing that has been used in the past. To solve this issue, we developed a communication application that highlights the best attributes in each of the popular communication methods described above, while mitigating some of the common problems associated with these methods of communication. Our application “Apprise” is designed specifically for academia and utilizes “Firebase” real-time database to connect students and teachers so they can effectively communicate. Teachers will be allowed to “add a class” (upon signing up) that essentially creates a group chat for the students to join. After creating the class, teachers will have access to a dynamic invite link that can be sent to students which allows them to join that specific chat room. Chat rooms by default will not allow students to write messages until the teacher grants this level of access. Granting access to writing privileges is managed by a role-based access control via firebase by giving teachers the role of “owner” for the individual classes they have created. Owners can either give access to individuals that have joined their room, take away individual privileges, or automatically grant writing access to anyone joining the room. Additionally, to allow for private conversations, teachers will have the ability to send messages to individual students if they need to.

2 Current Communication Methods

There are multiple different communication methods that students utilize on a day to day basis. To understand what it means to effectively communicate is critical for the success of both student and teacher; “Communication is the relational process of creating and interpreting messages that elicit a response” [Fofana, 2016]. With the current communication methods, students and teachers are struggling to communicate efficiently. This section will go over the most common forms of communication, their best attributes, along with some of the problems associated with those methods.

2.1 Email

Using an emailing service to communicate has been one of the main communication tools used in academia in the past. However, there has been recent studies that indicate students do not always check their academia email and often are selective with how many times they check their email, along with the time of day they check their email. 27 colleges and universities participated in a study that showed how college students interact with the internet

and found that instant messaging is growing in popularity amongst college students, even though email is still the most widely used communication tool [Jones and Madden, 2002]. The growing popularity of instant messaging services is widely due to the newer generation growing up with applications on their smart phones such as Facebook instant messaging or GroupMe. These applications allow the user to remotely chat with anyone in the group, even if they do not own a computer. This study also concluded that nearly 30% of the students did not check their email every day, creating a communication gap between professors and students [Jones and Madden, 2002]. Figure 1 illustrates how many times seniors and juniors check their email:

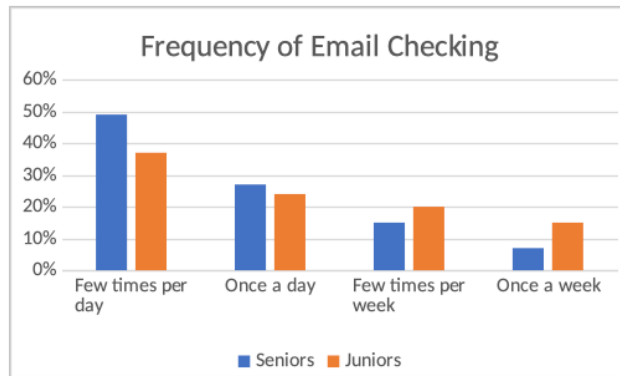


Figure 1: Frequency of email checking by students.

As shown above, nearly 50% of students are not actively checking their email and juniors check their email less regularly than seniors. Faculty members that are struggling with students not responding to emails or not reading their emails, are considering other methods of communication.

2.2 Text Messaging

Text messaging is one of the most favored forms of communication globally. Popularity for this form of communication is attributed to the following factors: ease of use, lightweight nature of sending a message, and social appropriateness [Battestini and Sohn, 2010]. A 4-month comprehensive study on 70 American Universities concluded that 70% of the time students favored this form of communication compared to any other forms, such as social media platforms like Facebook, or Twitter to reach out to classmates [Battestini and Sohn, 2010]. Additionally, students were asked why they used text messaging and their answers reflected that they used texting for the utilitarian benefits, such as replying to a question, requesting information from someone, or to setup a meeting. Texting is not being used because its exciting, students are using texting as a means of business communication. Students have reported the following benefits to receiving a text message [Castleman and Page, 2014]:

- 86% of students reported that text messages promoted them to complete a task they hadn't yet done.
- 85% of students reported that the text messages informed them about something they hadn't realized they needed to do.
- 84% of respondents said they found text reminders useful in helping them get everything done for college.

Research displayed at NACAC's annual conference showed that texting students increases engagement rate more than emails and phone calls and can improve college retention rates. However, students prefer not to contact their professors through texting because they do not want to give out their personal phone number. Out of the surveyed students in 70 American Universities, only 10% said they have contacted their professors with this form of communication [Battestini and Sohn, 2010].

2.3 Social Media Platforms

Social media platforms are another popular communication tool used globally, with Facebook being the more popular choice amongst higher education for student to teacher communication. Out of 77 different college institutions in a study, 65 of those colleges have tried to use, or are currently using Facebook as an additional means to communicate to their students. However, students are less likely to communicate via social media due to feeling dismay about teachers and faculty members seeing all of their personal information. A study done in 2016 concluded that a total of 65% of the students polled, have never tried to communicate via Facebook or any other social media website due to the reason listed above [Froment et al., 2017]. Additionally, 89% of teachers have never used social media platforms to communicate with their students. A vast majority of students are millennials (ages 19 – 29) which want a new way of communicating that doesn't compromise their private life. It's important for educational institutions to realize they need to adapt to a new communication method that is favored amongst this younger generation.

2.4 Group Messaging Applications

GroupMe, along with other popular "chat applications" that can be downloaded on either Apple or Android devices, are becoming more popular over social media and text messaging for academia communication. These applications include the best attributes found in social media platforms, text messaging, and email services that are favored amongst the younger generation. Amy Beebe, a student at the University of Texas, leads multiple engineering organizations. Amy uses GroupMe because its an effective way to communicate because GroupMe has a widely sought after benefit; communicating without

giving out any personal information such as phone numbers. Colleges are utilizing these communication apps and encouraging them amongst their peers, however, these applications such as GroupMe, impose a certain risk, or “grey area” that colleges have become aware of. Due to students using these applications with intent to create “secret” chat rooms for cheating, some universities have held conferences about whether they should continue use these apps as an additional form of communication. At the University of Texas Dallas, a student voiced their concern: “I’m an [engineering] Student and I’m absolutely fed up with the rampant cheating I see in the class GroupMe chats. This is wrong and they know it’s wrong. As future engineers and scientists we have to hold ourselves to AT LEAST SOME ethical standards!”. To combat this, some colleges are no longer suggesting the use of chat apps that grant students group creation privileges and are now looking for a safer alternative that can limit cheating.

3 Solution and Methods

“Apprise” is a communication tool for teachers, developed by students that attempts to solve the problems found in conventional communication methods, while also retaining the best attributes of those methods. To solve the communication problem, we developed a mobile program that would give the students and teachers an effective way to communicate, while trying to minimize the problems found within the methods explained in the previous section. Our solution takes the best attributes from email services, text messaging, social media platforms, and group chat messages to create a new method of communication for teachers and students.

3.1 Educational Appeal

Apprise was designed specifically for an academia setting and users will find that our communication tool is easy to use while also feeling familiar. Students and teachers will have class icons that are similar looking to your class icons commonly found on Desire2Learn (D2L). Clicking on the class icon will bring the user into their class chatroom where they can effectively communicate in real-time, similar to other group chat applications such as GroupMe.

3.2 Anti-Cheating

Apprise allows only teachers to create new chatrooms, limiting students ability to create “secret” chatrooms. This helps to mitigate cheating by only allowing teachers with the correct formatting in their email address to create chat rooms. Teachers and students have nearly identical formatting in their emails, however, there is a slight difference that allows us to effectively filter out those who are students and those who are teachers. For example, students typically

have an additional suffix added to their educational emails, our programming methods look for this suffix upon signing the user up and is able to classify each person accordingly within the database. An example of this can be seen below:

- John.Doe@live.bemidjistate.edu is classified with a 1 in the database
- John.Doe@bemidjistate.edu is classified as a 0 in the database

This classification is given to the users' node, along with other relevant information. Classifying users as a student sets the "student" field within the node to a 1 and vice versa for a teacher.

3.3 Privacy

Unlike social media platforms, Apprise maintains the students privacy due to the nature of the application. Apprise is meant for academia communication so users will not be able to use this application like a social media platform. After signing up for Apprise, the only information the teacher can see about a user's profile is the name and email address. Users can rest assured that our data is securely being transmitted through security protocols that have been implemented server side. Only the specified user can access the associated profile data (such as the password). If the user is not allowed to write or read to the database, the request will simply get declined. If a request does get declined, the declined user never reaches the database. We will not be showing our security rules for obvious reasons, however, figure 2 is a simplified diagram of how this works:

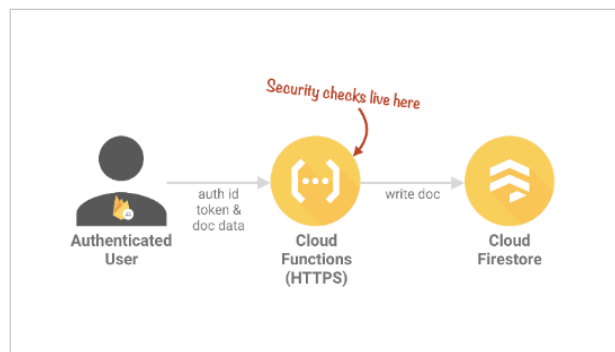


Figure 2: Security checks over cloud.

4 Firebase

Apprise uses a real-time database through "Firebase" that is powered by Google to store and sync user messages. Data is synced across all clients

in real time and will remain available if the app ever goes offline (lost connectivity), similar to Facebook messenger. Firebase is a NoSQL database that stores data as JSON which can easily be utilized in cross platform applications by using the appropriate SDK's for iOS, Android, or JavaScript. JSON is organized as a “flat” structure tree with collections, these are implemented differently compared to an SQL database which has multiple tables that are typically connected via a unique ID. Firebase does utilize a unique ID within each collection (if the programmer set it up for this capability), but it is not directly linked to another collection. Due to security risks, we will not be showing an example of the database structure to Apprise, however, we will provide a simplified version of how this structure might be laid out in firebase as shown in figure 3 below:



Figure 3: Security checks over cloud.

In the previous illustration, a unique ID has been set to the rooms that is generated by the creator of the room (in Apprise this would be the teacher). The sender's ID is a unique set of characters that is typically created by firebase, unless the user specifies a different ID creation. This ID is used to push data to the database and to pull the relevant data needed. As you can see, the structure for this “rooms” collection is “flat” and does not directly link to any other collection within the database. To push data to other collections, we simply use the user's ID and collection names to identify where the data needs to get pushed to within the programming of the application.

4.1 Realtime Updates

Real time updates are an important part of this application which allows users to receive push updates to their phones cache, dynamically. Firebase has a unique feature that stores a copy of the relevant collections that have been pulled from the database on the users cache. This was programmed to only store what the user needs and nothing more, limiting the used space on their phone and limiting the amount of pulls the user requests to the server. Upon signing up to a chatroom, a snap shot listener is added to that chatroom on the users phone so every time a user sends a message, the database listener fires and sends push updates to all the associated users of that chatroom.

4.2 Dynamic Invites

Upon signing up to Apprise, the teacher will have access to a special inviting feature that allows students to join the classroom easily through dynamic invite links. Dynamic invites are currently programmed to last the duration of the chatroom (typically until the semester ends) or until the teacher deletes the chatroom, whichever comes first. Key benefits to using dynamic links are that when new users attempt to click a link they will either be directed to one of two locations:

1. If the user clicking the link does not have the application installed, it will direct you to the app store so the user can download the application. Afterwards, you will still automatically join the chat room without clicking on the link.
2. If the application is installed, it will automatically open the application and add that classroom to the users class list. This makes it easy for users who do not have the application installed while also simplifying the process to joining chatrooms for those who do have it installed.

4.3 Permission Granting

Teachers have full control over the permissions within a chat room. By default, only the teacher will have permission to write messages. However, the teacher can enable this feature by either giving individuals permission or by giving the entire room permission with one click. This allows the teachers to manage the users efficiently in an easy to use manner. Permission granting is enabled through firebase's "Role-Based Access Control", essentially the teacher has the role of "owner" and students, by default, have the role of "readers".

4.4 Formatting Conventions

"Writing clean code is what you must do in order to call yourself a professional. There is no reasonable excuse for doing anything less than your best." (Martin, 2008) Professional programmers use many methods to help them format their source code. This allows you to not only look professional, but makes the source code easier to understand for others including yourself. Below you will find some of the formatting guidelines that have been followed.

4.5 Naming Conventions

Naming conventions that have been practiced while writing this application will make the source code easier to understand for anyone looking at it. A common technique used while writing this application is a method called "Camel Case" or "camelCase". Additionally, variable names were picked that are distinctive to what is being referred to, such as the messages view controller. Refer to table 1 below for additional explanation:

Description	Naming Conventions
Declaring a variable for messages view	messageViewTable
Declaring a variable for user message	userMessage

Table 1: Table shows the naming conventions.

4.5.1 Pseudo Code

Pseudo code was added to explain what specific functions or algorithms are doing that might otherwise confuse someone such as a debugger without the detailed comments. Comments left in the source code are informative but to the point. While programming this application, I was cautious not to use redundant information in the comments such as complicated concepts or obvious information. Programmers who find themselves frequently using comments or pseudo code need to think about how they can explain themselves within their code rather than with a comment.

4.5.2 White Space

Using white space was used throughout the source code carefully to make it easier to read and understand. Without the use of whitespace, a program often looks cluttered and unprofessional. White space should be used anywhere that will make the program more readable, especially to align parallel code horizontally or to separate logical expressions vertically. Separating logical expressions (functions, and classes) vertically with white spaces is a common practice in the work field. Typically, a professional programmer will utilize one vertical white space per logical expression. To appear professional, the use of excessive white space was avoided.

5 Future Work

5.1 File Sharing

File sharing will become available for both teachers and students. This will allow teachers to share documents, pictures, and videos to the classroom. Additionally, if a student is stuck on a homework problem, they can share their current progress by sending a picture of their homework to the teacher for additional help.

5.2 Like Messages

Having the option to “like” a message is a way for the students and teachers to display that they have received your message without writing a detailed response. This feature will also allow other students to “like” a question that

was sent in the group chat, indicating that more than one student would like to know the answer to the question that has been asked.

5.3 Message Archive

Classroom chats that have ended and are no longer available will be archived for the users to return to. Users will have the ability to either delete their archives forever or keep them for a certain time. After eight months, archived messages will be automatically deleted.

5.4 Profile Customization

Teachers will eventually be able to add in a custom profile that features important information for students. Teachers will be allowed to add in their office hours, their office number, and their syllabus documents. This feature will allow students to more easily find some of the most sought-after information about their class and their teachers.

5.5 Teacher Search

Sometimes students reach out to other teachers for various reasons. In future updates, we will allow students to search for a teacher at their institute. If the teacher has signed up for Apprise, the student will be able to directly message that teacher and initiate a new chat.

5.6 Student Worker Role

Classrooms might have student workers that are responsible for helping new students with any questions that they might have. Teachers will be allowed to give their student workers a role that will put a special icon on the worker's name tag, allowing students to identify the worker if he/she responded to a question.

5.7 Cross-Platform Support

In future updates, we will push out new native apps for Android, and Windows devices, including desktop versions for both Mac OS and Windows OS. Our goal is to make this program readily accessible for anyone that may need it. Additionally, we want users to have the ability to chat with their classroom from their desktop computer, or on the couch using their phone.

6 Conclusion

In conclusion, multiple different methods are currently being used in academia to bridge a communication gap between teachers and students. Texting, social

media services, and group chat applications are increasing in popularity due to a higher response rate amongst students. Colleges that have utilized these different methods have had a magnitude of problems associated with each one. Students have shown through their actions and responses that they favor these new tools over the current conventional emailing method that is predominantly used. However, with the faults in each method and due to the increase in popularity amongst these methods, it's apparent that a new communication tool needs to be developed. Apprise mitigates these issues and retains the best attributes that both teachers and students have enjoyed while trying these new communication tools. Unlike other communication apps. Apprise is designed for academia, by students who have worked closely with teachers to create a solution for the communication gap. "Learning and innovation go hand in hand. The arrogance of success is to think that what you did yesterday will be sufficient for tomorrow." (William Pollard)

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