

Ready



ECE1778 - Creative Mobile Applications

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Word Count: 2494
No Penalty (no overage)

Introduction

The goal of Ready is to improve student success in the math classroom by keeping students accountable and thereby preparing them for high-stakes unit tests.

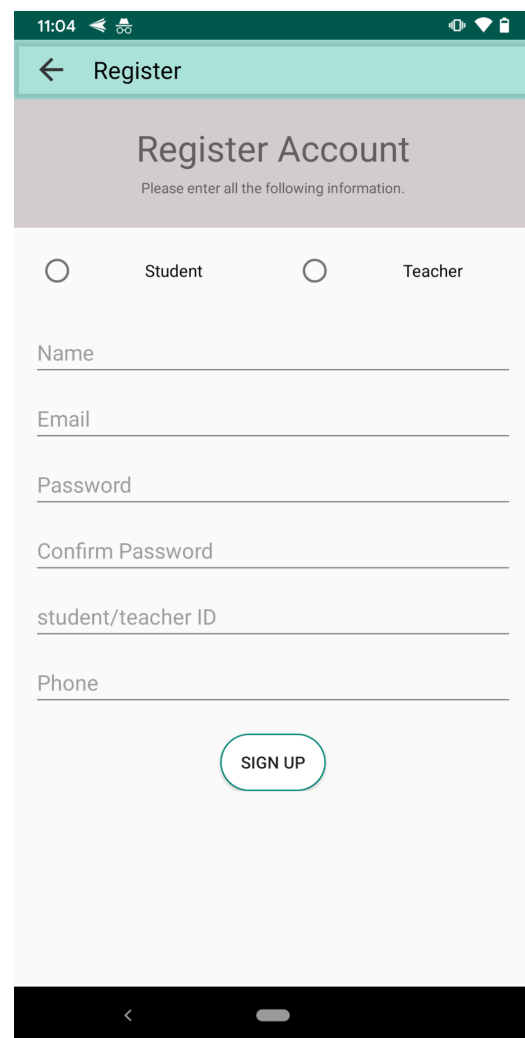
In most Ontario schools, courses are semestered and run quickly — approximately 4 months. Because of the fast pace, an integral part of a student being successful in the math class is doing *daily* work. Since math is an applied subject and concepts *build*, practice is an essential component. Studies show that completing homework regularly “significantly affects student achievement” (Guyen and Akcay, 2019, p.1377). Furthermore, because high school students are teenagers, they may lack the motivation or organizational skills to do homework on a *regular* basis. Thus, one of the fundamental features of our app is to keep students accountable to their daily work. Our app requires students to upload their homework to the app, daily. The app reports those that have not been submitted to the teacher so the teacher can take next steps.

Formative assessments help students and teachers to identify any strengths and weaknesses in learning and target areas that may need work. The goal of formative assessments is to monitor student learning to provide ongoing feedback in a no-stake setting. Formative assessments do not count for marks. They simply provide students an opportunity to demonstrate their learning and gain feedback. Simply put, a formative assessment is a means by which teachers assess to what extent their students have grasped a specific concept in order to inform their instruction before moving forward. “Firm evidence shows that formative assessment is an essential component of classroom work and that its development can raise standards of achievement” (Black and William, 1998, p.139). In the math classroom, most often these take the form of a quiz. The quiz consists of a few questions. It is similar to what students might see on the summative unit test evaluation, only much more brief, covering the concepts most recently learned. Most units would have 2 or 3 formative quizzes (though there may be more). Completing them may reveal the missteps that students might be making, so that students may correct them before a high-stakes unit test. In Ready, teachers assign a quiz several times in a unit. The quiz is completed by the student where full solutions are uploaded and final answers are entered. The final answers are auto graded. Teachers can look at student solutions, provide feedback and offer help as needed.

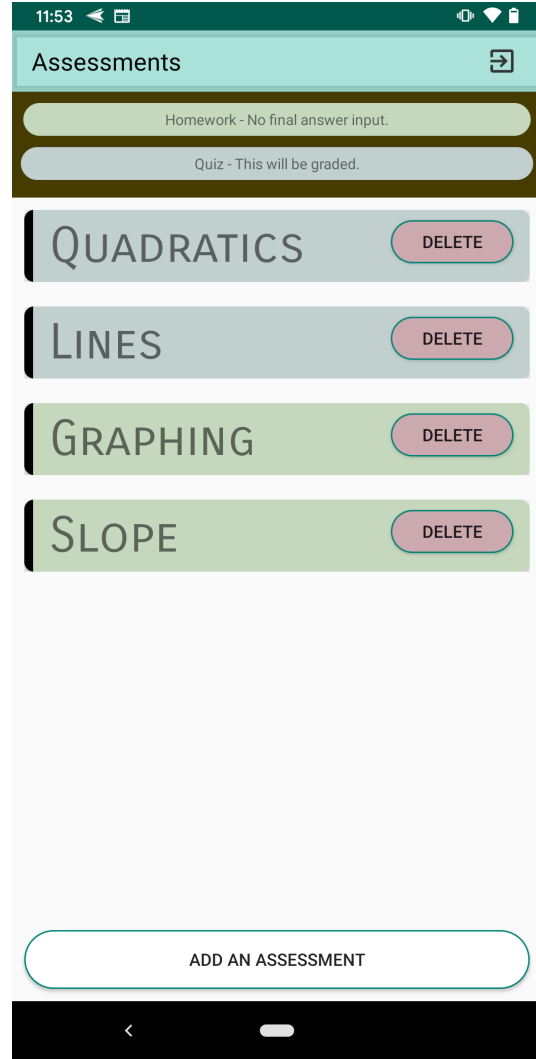
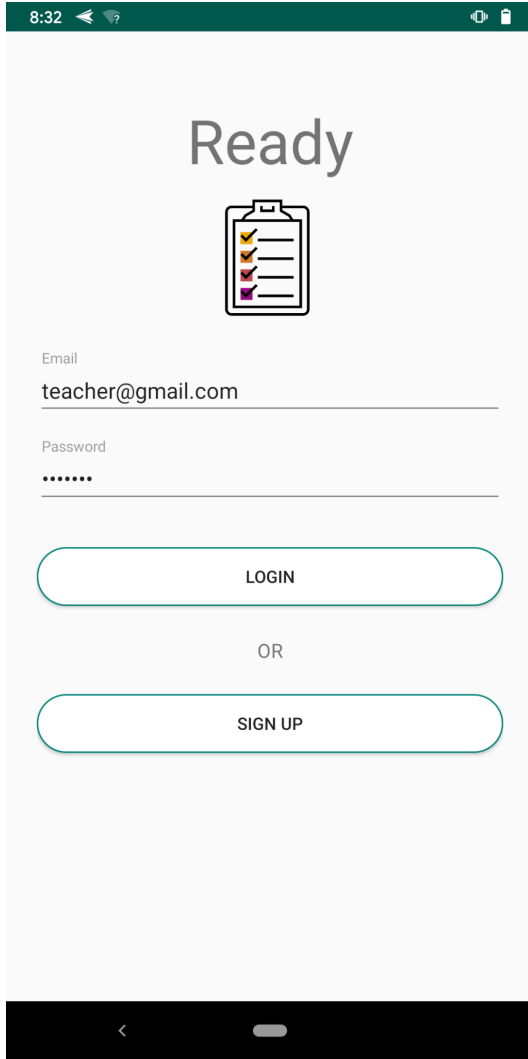
Studies show that parent involvement is strongly and positively correlated with student success (Henderson & Berla, 1995; Kohl, Lengua, & McMahan, 2000). In Ready, the teacher can notify parents about incomplete homework submissions or poor quiz results with a push of a button. The messaging feature is *fully* customizable. The teacher can use their professional judgement to reach out to a parent. If the student has a one-off poor quiz, the teacher may decide not to make contact. If this is a chronic problem, reaching out to the parent can help to get the student

on track. By keeping parents involved in a timely manner, student success is likely to improve. Traditionally, teachers have been keeping parents involved in their child's progress by sending home quizzes or other work for a signature, by phoning them, or by emailing them. This can create a time lag in which a parent gets necessary information regarding their child. It is also less efficient for the student and the teacher.

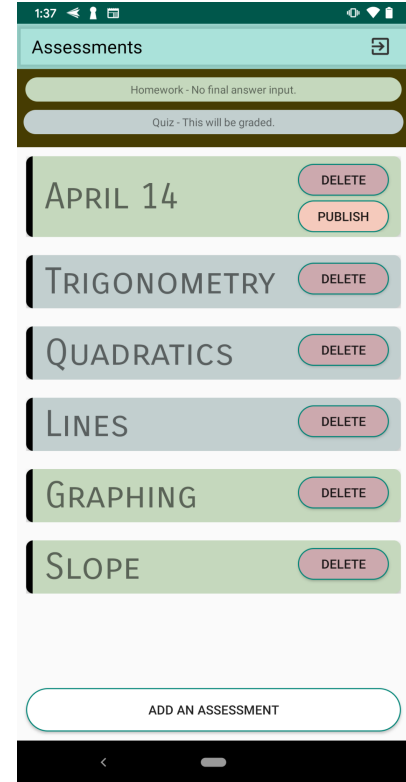
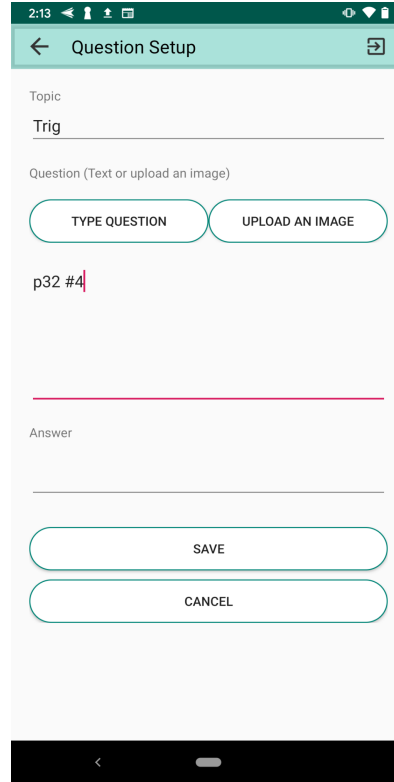
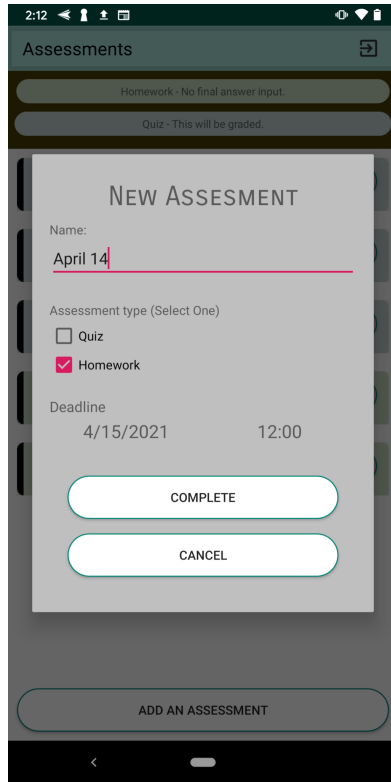
Statement of Functionality & Screen Shots from App



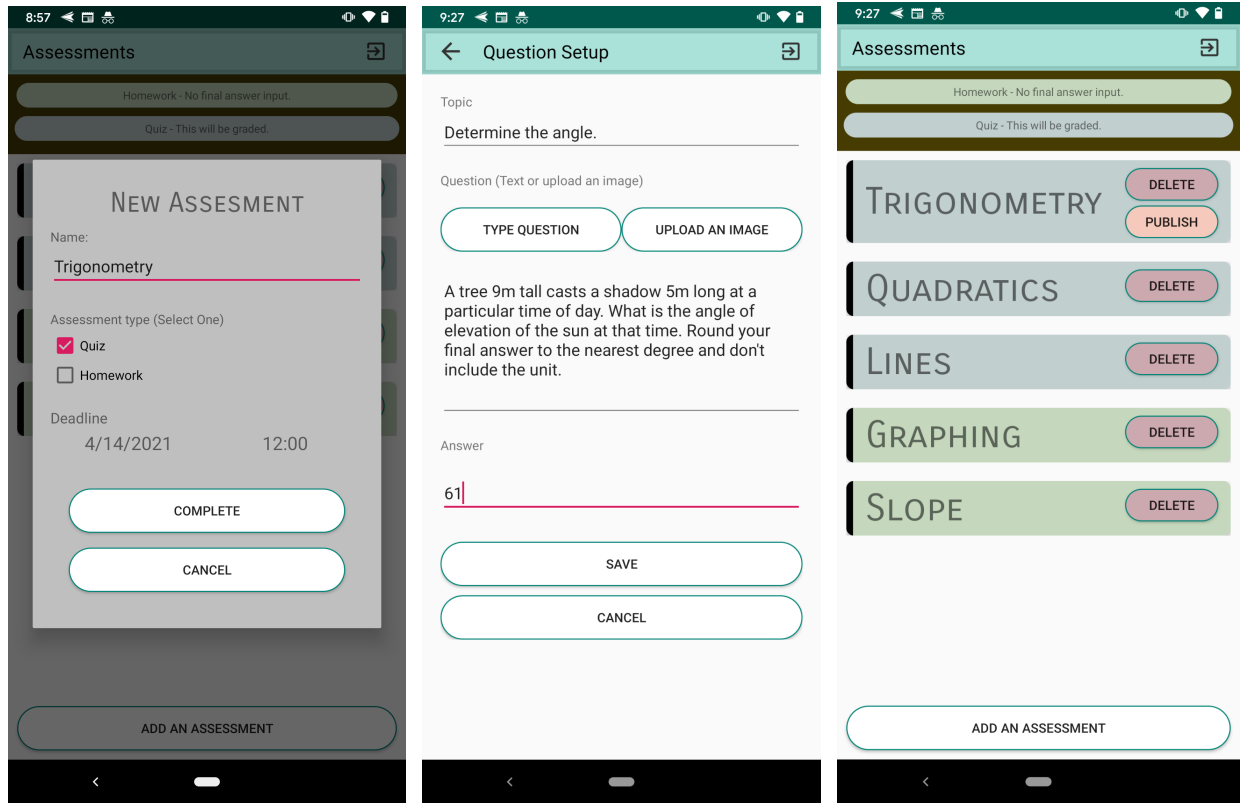
Ready has a student mode and a teacher mode. Users create an account as such.



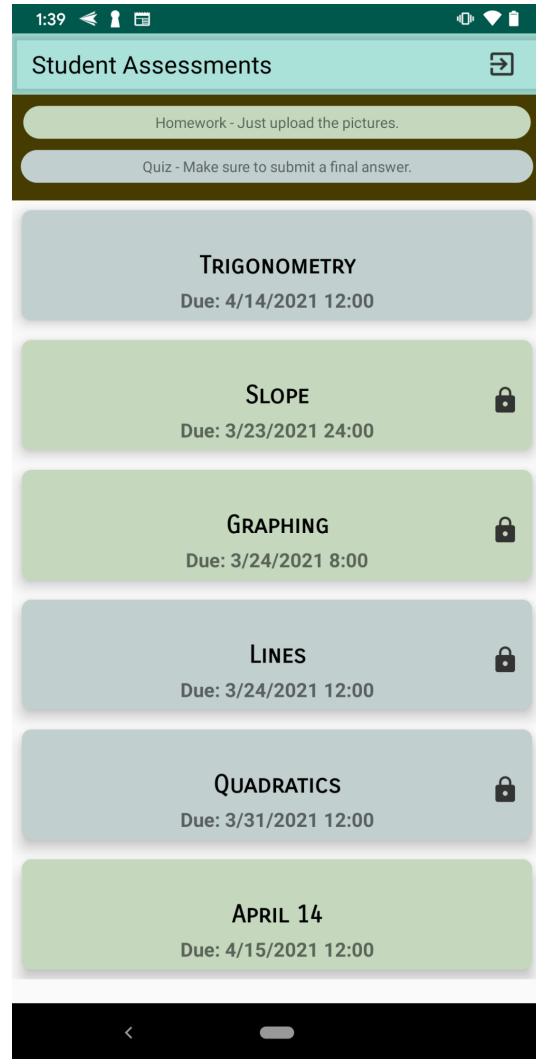
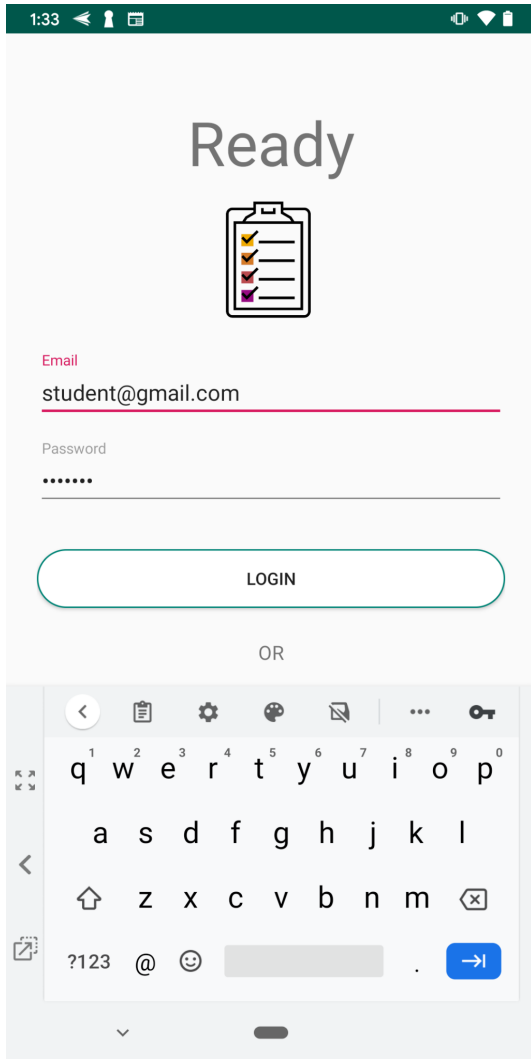
Once a teacher logs in (above left), they come to the landing page, which shows which assessments have been assigned or created. Items are colour coded for ease of reference, with homework items in green and quizzes in blue, as shown above right.



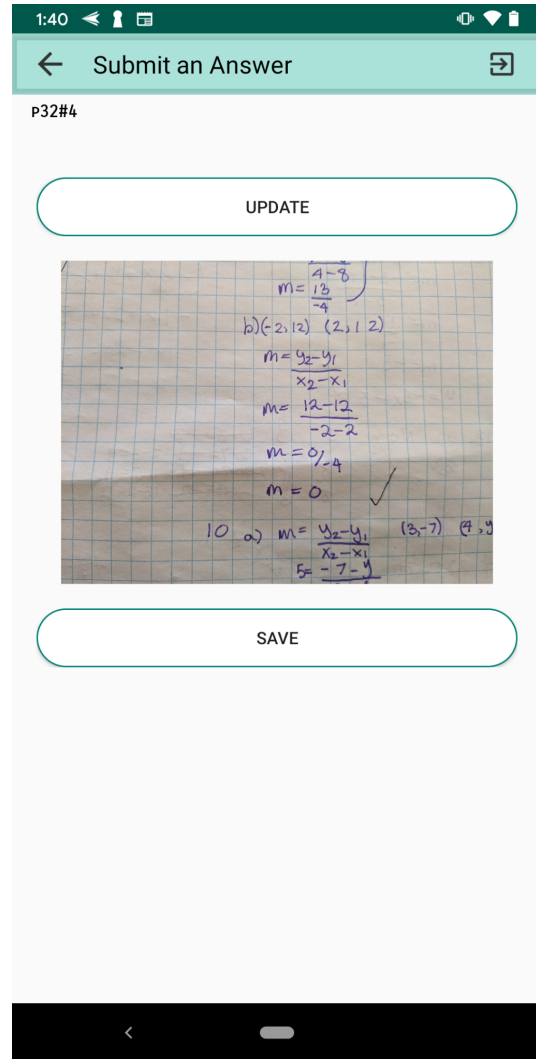
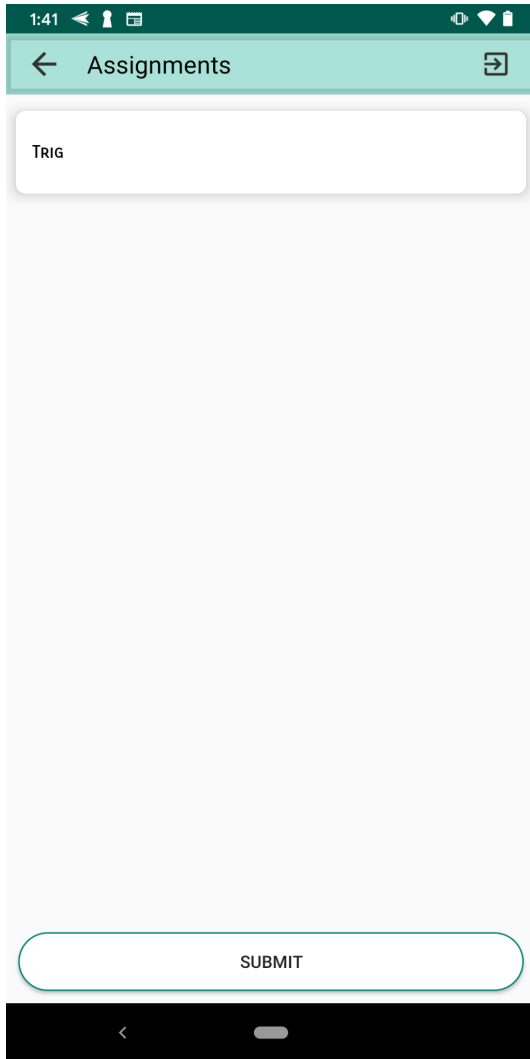
The teacher can create a new homework assignment by clicking “add an assessment” and choosing “homework”. The teacher inputs the deadline date and time, as shown above left. The teacher can then assign the homework by typing it, uploading from an album, or by taking a picture, as shown above middle. When the teacher is satisfied with the assessment, they can press publish, as shown above right. Once published, students can see the assessment.



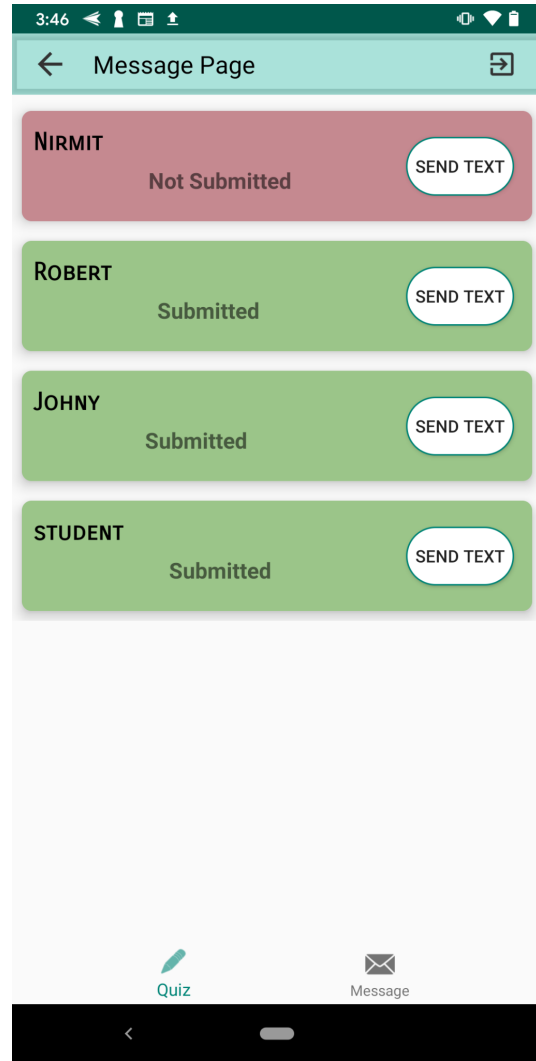
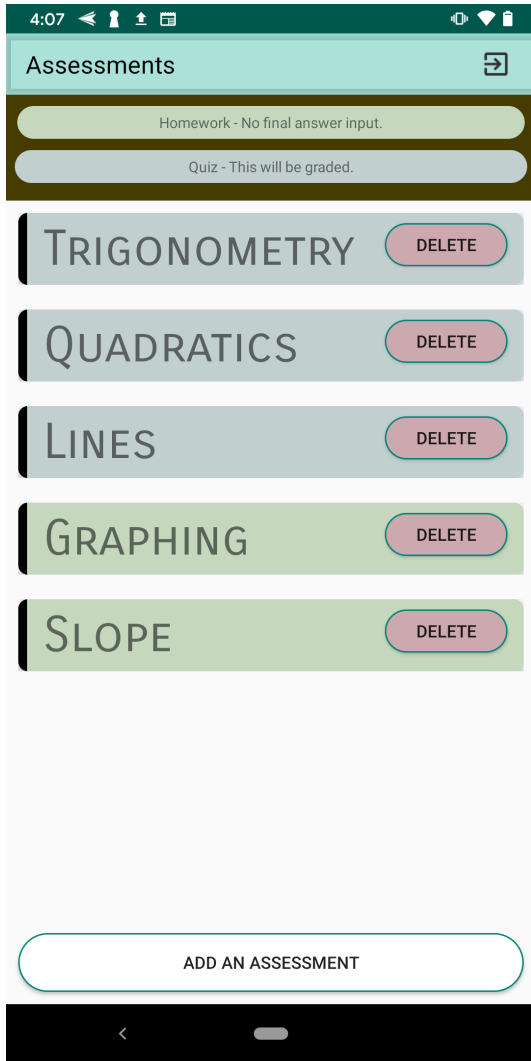
The teacher can create a quiz in a similar way. The teacher clicks “add an assessment” and then “quiz” and inputs the deadline date and time, as shown above left. The teacher can then populate the quiz with questions and answers. The questions can be typed, uploaded from the album, or by taking a picture. The answers are also entered for auto grading as shown above middle. Once the teacher has entered all questions and is satisfied with it, they can publish it, as shown above right. Once it is published, the student can see the assessment on their end.



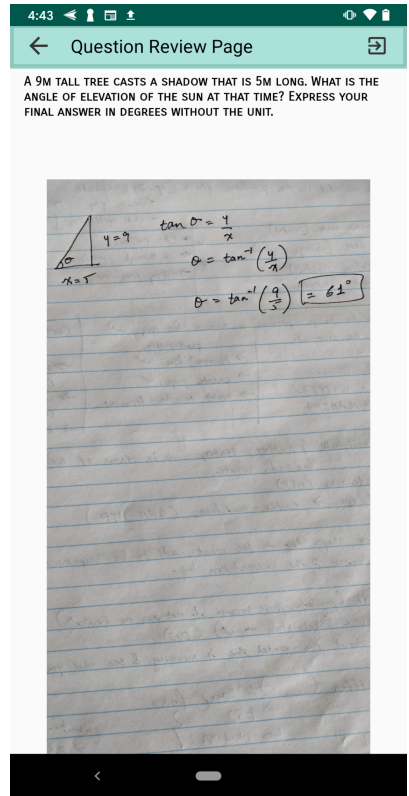
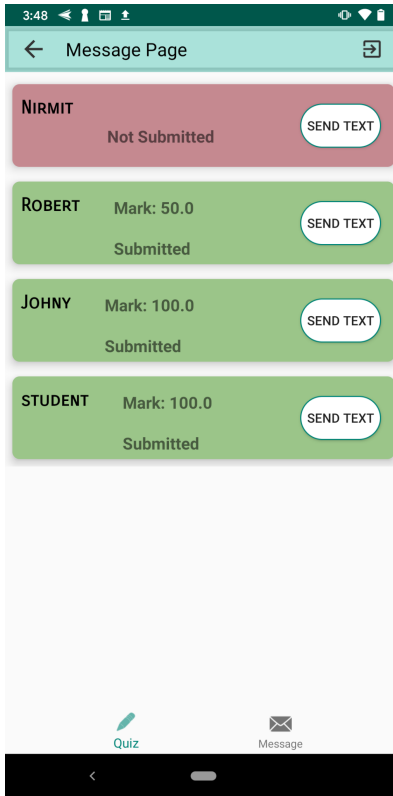
When a student logs in, the landing page is colour coded similar to that of the teacher, with homework items in green and quizzes in blue, as shown above right. Items that have a lock symbol can no longer be submitted because the deadline has passed. Those without a lock have an upcoming due date and can be submitted. Due dates are shown below the item title.



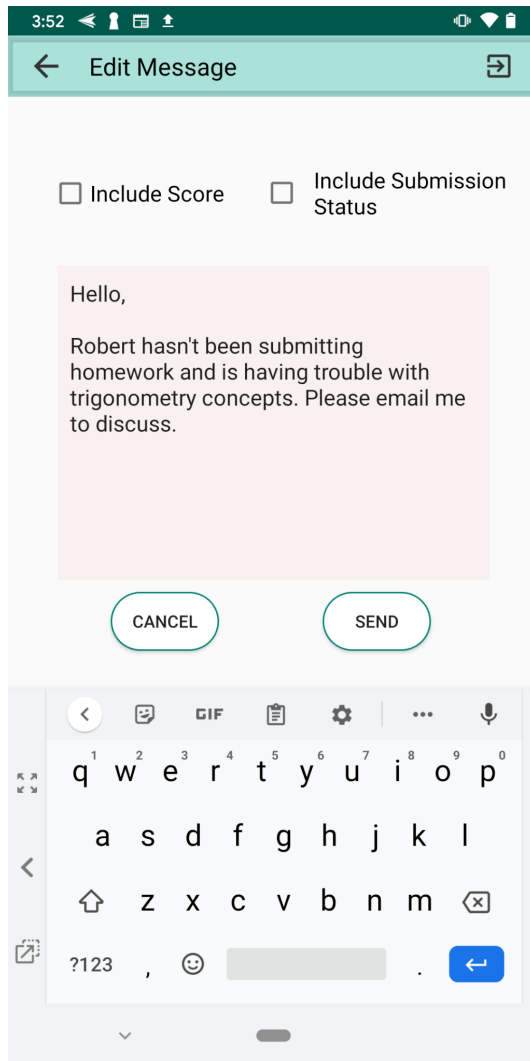
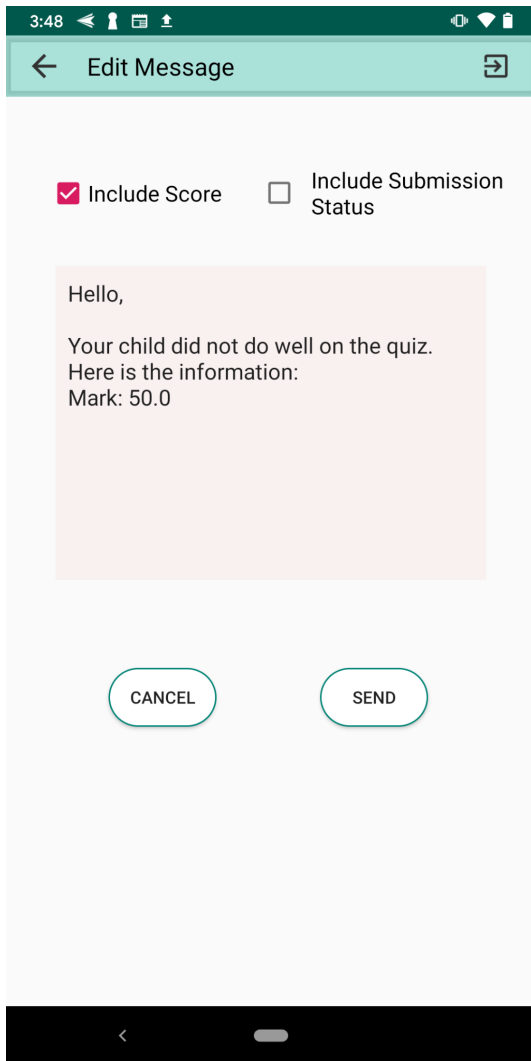
After clicking on a homework assignment (above left), the student can upload their homework by accessing it from the album or taking a picture. Students can save and review their answer at a later time and even upload a new solution. Once they are satisfied, they can submit it. Quizzes are submitted in a similar way, with the addition of a final answer, which will be auto graded.



Once students have submitted an assessment, the teacher can assess it. In teacher mode, the teacher can click on an assessment, as shown above left. If it is a homework assignment, the teacher can then click on 'message' to see who has and has not submitted, as shown above right.



If the teacher clicks on a quiz and then message, as shown above left, they will be able to see the results of the auto graded quiz, as shown above middle. If the teacher clicks on the student's name, they can see the student's uploaded solution to see where help may be needed, as shown above right.



If the teacher clicks on “send text” the teacher can send a message to the parent. The default message populates, as shown above left. However, this is *fully customizable*, as shown above right. The teacher can use their professional judgment as to which parents to reach out to, and what to say. They can also opt *not* to send a message.

Overall Design

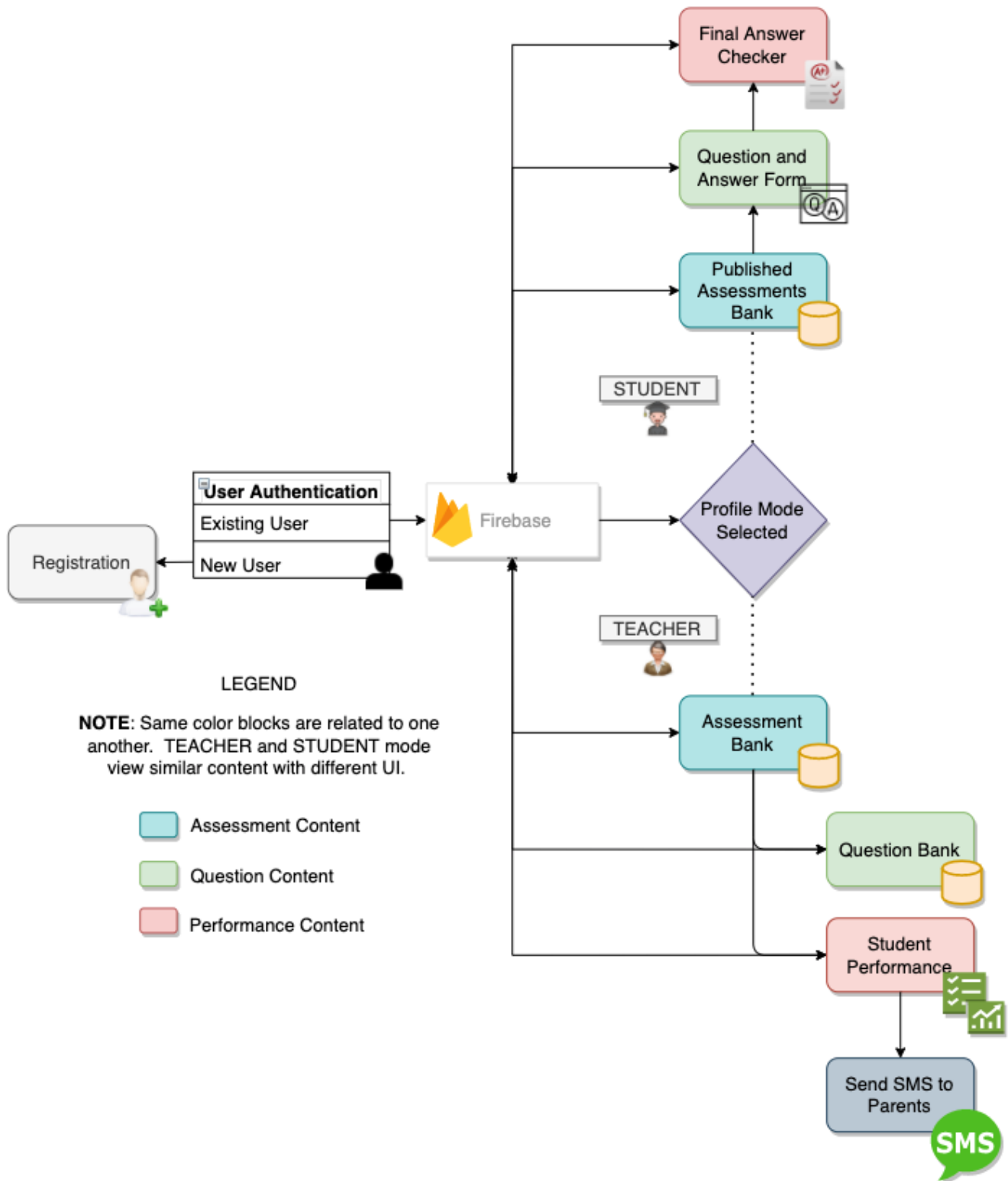


Figure 1: Block Diagram of Ready App

User Authentication

Users can either register an account or log in to existing accounts. During the registration process, users have to select where they want to sign up — as a teacher or a student. Depending on the mode they select, an appropriate UI is presented.

Depending on the mode (Teacher Vs. Student), the app presents similar content with different UI.

	Teacher Mode	Student Mode
<i>Assessment Content</i>	Teacher is capable of creating and modifying the content of the assessment. Teacher sets the deadlines and publishes the material as needed.	Published assessments are visible to students. Students have until the deadline to access the material.
<i>Question Content</i>	Teacher is able to formulate the question here. Teacher has the capability to either upload an image or take a picture right from the app.	Students get to view all the questions for an assessment. They have to provide answers to each question. Homework assessment does not need a final answer but quizzes do.
<i>Performance Content</i>	Teacher gets the view of all the submitted work along with the final mark.	Once the student submits the final work, quizzes are graded based on the final answer.

SMS Capability

This is only functional for teachers. The teacher can send an SMS to parents through the app. This allows teachers to inform parents of relevant information about their child.

Reflection

Keep it Simple!

The course taught us that if you have the desire to put your innovative ideas into action, you can start simple and expand later. Even with time restrictions and other commitments, we were able to successfully complete the project. The best solutions may not present themselves at first; you can iteratively improve and solutions may evolve.

Plan and execute in order

Work division for each spiral helped us tremendously. Early on in the project, we planned out what each person would be responsible for and what we would need to get done for each spiral. Every team member contributed and each of us did our part in a timely manner.

Reflection of industry work

The project taught us how to interact with people with different skill sets. Programmers working in the industry have to interact with managers and product managers to understand requirements. Non-programmers don't realize how complex programming can be. What may be deemed as a simple ask may involve lots of work. Communication and an openness are key in this respect. This project gave us a glimpse of what a diverse work environment may entail and taught us how to better engage with each other.

Contribution by Each Group Member

Fulin(Irene) Huang, Programmer

I mainly worked on the student mode layout, which allows students to view and submit their answers. More specifically, students can upload an image either by taking a picture or choosing from the album and provide a final answer for each question. I also implemented the auto-grading system, which calculates student grades based on their final answers. In teacher mode, I mainly worked on the message UI, which allows the teacher to view student submission status and marks. I also worked on the review page, so that teachers can review student work if needed. Finally, I constructed Firebase database models for Answers and Marks to save all the data for student submissions.

Ingrid D'Silva, Specialist

I brainstormed possible app ideas and presented them to the team. I provided the background knowledge and expertise for the app. I conducted research to determine and justify which features were appropriate for the app. I helped to create the user flow in Marvel. I helped to find bugs by testing and providing feedback for each iteration. I helped to facilitate the end result by working closely with the programmers.

Nirmit Zinzuwadia, Programmer

I constructed Firebase database models for User, Tests and Questions. I primarily handled the Teacher mode layout pertaining to assessment and question creation. Along with that, I worked on the SMS module that allows teachers to send a text through the app. Additionally, I worked on some portion of the registration page. Finally, I set the color scheme to each layout for user reliability and easy interaction. It involved setting different colors for homework vs. quiz assessments, distinguishing between submitted work and ones that haven't been submitted, and highlighting students that did poorly on their quiz based on their marks.

*All members of the group contributed to weekly meetings, brainstorming features, testing, and integrating feedback from the professor and peer reviewers.

Specialist Context

Ready makes class time much more efficient for both the student and the teacher. Class sizes have increased in the last few years and they have also become de-streamed (no more levels in classes). With de-streamed classes, teachers have to provide differentiated instruction to students. These issues make time in class more precious than before. By automating homework checks, the teacher is able to make better use of limited class time with more students. The literature has shown that formative assessment — which is a no-stakes form of feedback aids in student success. By providing formative quizzes in the app, the teacher can assess student progress and provide feedback and help to students in a no-stakes way. The auto grading system saves the teacher time and gives quick feedback. De-streamed classes result in students that have a wide range of abilities. This is an emerging issue and the potential for the app to help with this is enormous. The app allows teachers to see which students are having trouble and in which areas the trouble lies. Teachers can then create peer groups in which students can learn from each other. Similarly, by grouping students through formative assessments, teachers can offer students additional practice or instructions based on which questions in the formative assessment students had trouble with. The app can also provide enrichment opportunities. This

is important because it is critical to keep high-performing students engaged (Hertberg-Davis et al, 2013). Similarly, the app can provide remediation opportunities for struggling students.

The messaging feature of the app keeps parents in the loop of their child's progress in a quick and efficient manner. It also allows teachers to reach out to parents in an efficient and practical way.

With the move to periodic online learning due to the pandemic, there has been more of a reliance on software and electronics in learning. This has also created more comfort with electronics on the part of teachers. Even when classes move back to full-time in-person classes, I expect more use of web and mobile apps in the classroom. In this way, Ready's application is more timely and meets a current need.

Future Work

Ready aims to help students become "ready" for summative assessments. As a result, we would like to focus most of the feature work in this area. One way to meet this need is through integrating peer groups. The app would take care of the logistics of pairing students. Ideally, the app would pair students that have performed poorly with students that have done well on particular questions. In this way students can learn from each other. Studies show that peer learning is of great benefit to both students when peer pairing occurs (Tullis and Goldstone, 2020).

Ready currently does not allow students and teachers to communicate. We would like to have a chat channel where students and teachers can communicate with each other via app. Students that are shy to ask questions in class can benefit greatly from this feature.

Finally, we hope to integrate a system where we initiate a one-way channel to send the text to the parents and know that they have viewed the response. Currently, teachers can send a text to the parent but there is no way of knowing whether they have viewed it or not. This would hopefully help teachers know if parents have received the message they wanted to communicate.

Statement of Consent

	Presentation Video	Final Report	Source Code
Fulin	✓	✓	✓
Nirmit	✓	✓	✓
Ingrid	✓	✓	✓

*We ask that any use of this project be appropriately credited to the contributors.

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