# Study Buddy

## Study Smarter

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**Problem and Solution Overview:**

Standardized tests such as the GMAT, LSAT, MCAT, ACT, and SAT are an important part of a student's application to both graduate and undergraduate programs across the country. The way a student performs on one of these tests can greatly affect whether or not they are accepted and how much money they will make in their future career. There are several problems that exist for students who are preparing for these tests. It is difficult for students to track their progress to appropriately pace their studies. Students often overlook the importance of practicing test-taking skills. Many students study alone for standardized tests and don't reap the benefits of group learning. We propose an application for AR glasses that would act as a study assistant. Our application would use the camera on the glasses to monitor the student's study session and would display useful information to help make the session more effective. Our application would provide coaching to improve test-taking skills, monitor progress towards the student's goals, and even connect students for peer study sessions.

**Contextual Inquiry Target, Stakeholders, and Participants:**

Sarah: the subject of our first CI, is a high school math teacher planning on taking the GRE in order to get into Graduate School. We conducted the CI in her home where we observed her process of preparing a study plan for the GRE. Because she is a math teacher she felt pretty confident that she wouldn't need to pay for a GRE prep class to do well on the GRE, however she still wanted to study in order to do her best. Her main resource for study materials was the GRE website because they develop the actual test she would be taking. Sarah organized her study plan by looking at the different sections of the test (Verbal Reasoning, Quantitative Reasoning, and Analytical Writing) and the amount of time she had until the test. She decided to study each section twice (one per week), with room for an initial practice test, to get a feel for the material, a practice test halfway to the actual test, and a practice test the week before the GRE. She felt that the practice tests would be the most important part of her studying because it would help her adjust and direct her studies. She also physically created a weekly calendar using a pen and paper because she felt like she would forget about a schedule on her phone. She wanted something she would see everyday when she got home to remind her to study.

Spencer: a recent graduate from the University of Utah with a degree in finance. He wants to go to one of the top business schools to get his MBA and needs a high GMAT score to be admitted. He wants to go to IE Business School in Spain, which is ranked the 4th best international business school. The average score of admitted applicants is 670, which is the 83rd percentile. He took the test in May but only scored a 650. He believes he needs to score 700 or higher to make up for his limited work experience and mediocre GPA. He is planning on taking the GMAT again in January and is just starting to put together his new study plan. During his contextual inquiry we noticed that he focused a lot on taking practice tests. He scheduled at least one full practice test a week, not only to help him study, but also to help him practice and improve his test taking skills. This was valuable information because even though someone may be prepared intellectually, their test taking skills will also affect their score.

Boris: a Medical Assistant who graduated from the University of Southern California in 2013 with a Bachelor's Degree in Physical Therapy. He is currently working at the Veterans Hospital in Salt Lake City and recently began studying for the MCAT so he can pursue his dream of becoming a Physician's Assistant. He has already taken the GRE and performed well, but wants to also include the MCAT on his applications for Physician Assistant School to improve his chances of getting accepted. We performed the Contextual Inquiry in his bedroom at home where he does the majority of his planning and studying. The reason we wanted to observe Boris was because he is participating in a specific MCAT class that helps him prepare and study for his test. We observed that he took little time to make an actual study guide. His teacher provided him with a syllabus that specified a list of subjects they should focus on each week until the end of the course. The teacher had also scheduled practice tests with benchmarks for them every other week in a setting that will replicate the actual test. Since his teacher already provided him the material he needed to study for the week, I started to observe how he planned when he was going to study. He used a weekly planner but he didn't actually set specific times to study. He used the daily to-do list to specify the subjects he needed to study each day so that he covered all the teachers specified material for that week.

## Contextual Inquiry Results and Themes:

Each of our participants considered practice tests to be one of the most important aspects of their preparation. We learned from Spencer that success on the GMAT relies more on test taking skills than on actual knowledge about the subject matter. Sarah and Boris reaffirmed that for the GRE and MCAT, practice tests are an important assessment of one's progress in learning all of the necessary material. It seems like practice tests are an important part of the study process for any standardized test and definitely something we should incorporate into our design.

In our inquiries, we noticed that all of our subjects always seem to study alone. It seems whenever they struggle with a concept, they go to the internet and begin searching for resources that might help them understand something better. Research has proven that studying in groups is more effective than studying alone because people can work off of the strengths of each other. We think that it would be very useful if we could help our users connect with other each other in order to capitalize on this strength.

All of our participants had set a desired score as a goal. We learned all about Spencer's process of coming up with his goal and it seemed like the most thorough. We don't know quite as much about how the other two arrived at their desired scores but they also seemed convinced that these scores would get them accepted into their ideal graduate schools. All three of them used their goals to measure their progress on practice tests. It seems like having a goal score is an important part of the study process and we definitely want to include it in our application.

Each of our participants decided to break up the test by subject to make their studying more manageable and organized. Sarah decided to study each section each week to make sure she stays on top of all of the subjects. Spencer prioritized the sections he would study based on the results from his practice test. Boris strictly follows his teacher's weekly study guides. Since it seems like all of the standardized tests we have considered are divided into subjects, this seems like an important component to implement into our design. Since these tests can be so big, it makes sense that our users would want to approach them in smaller chunks that are easier to digest. We will keep this in mind when making design decisions so that our system can scale and work with most standardized tests.

**Answers to Task Analysis Questions:**

1. Who is going to use the design?
   Our design will be used mostly by students preparing for standardized exams that require large amounts of time, preparation, study, and focus.

2. What tasks do they now perform?
   We have found that some of the tasks they perform include building a study schedule, setting a target goal, studying the material, taking practice tests, searching for study material, and finding additional help and resources.

3. What tasks are desired?
   Our users desire an easier way to find helpful examples with topics they are struggling with, a better way to plan and organize their study schedules, a way to find the best practice tests and books for studying, a way to make short periods of study more effective, and a way to effectively improve their test taking skills.

4. How are the tasks learned?
   Our users generally learn how to perform their current tasks by trial and error over the many years that they go to school. Some tasks have been learned by taking specific courses and being taught how to prepare for standardized tests.

5. Where are the tasks performed?
   Most commonly, our users perform these tasks in the comfort of their own homes, however sometimes they will sometimes perform them on their school campuses, at a local library, or wherever else they may choose to study.

6. What is the relationship between the person and data?
   Some of the data, such as study schedules and calendars, will be personal data. Users will also be encouraged to post their scores on the exams and their practice tests, so that users can compare their scores with others and in order to help find the most successful study plans and books. Their scores will not be directly visible by others, but the aggregation of scores will be.

7. What other tools does the person have?
Users also have calendar apps to help plan, google to help them search for the best plans, books, and questions, pen and paper to write their plans on, test prep classes, and test prep books.

8. How do people communicate with each other?
Currently people usually communicate with each other in person, texting, phone calls, or with group chat apps.

9. How often are the tasks performed?
Planning, scheduling, and picking books are generally done only once per time a user takes a standardized test, which is usually fairly infrequent. Finding and taking practice tests and studying are done fairly frequently during the study preparation period. We found that our inquiry participants all seemed to want to study every day for at least a small amount of time, but it seemed that it was difficult for them to effectively get much done in a small period of time. Some of them plan to take practice tests weekly, and sometimes they plan to take one or two more serious practice exams at a midway point in their preparation or at the end of their preparation.

10. What are the time constraints on the tasks?
Time constraints can vary from one user to another depending on how much time they intend to study for their exam. One of our inquiry participants said she would want about 3 months to prepare for her exam, where another is beginning his studies a year before he plans his first test attempt. Generally they spend about an hour or so planning their schedules currently. They will usually spend a couple of hours each time they study or take a practice test.

11. What happens when things go wrong?
When things go wrong, users may end up missing their study sessions or not studying as much or effectively as they planned to. This could ultimately cause poor performances on exams and possibly needing to retake them. Some tests don't allow you to remove bad scores.


**Proposed Design Sketches:**
Design 1 - Phone App
        This design allow users to enter information into a phone application which keeps track of study topics and progress. The application also suggests study topics based on a user's past results and allows users to take a quick quiz within the application.

- **Short study sessions**
  - Users will be able to customize how long and what topic the quiz will be. A quiz will be made according to the requested parameters.
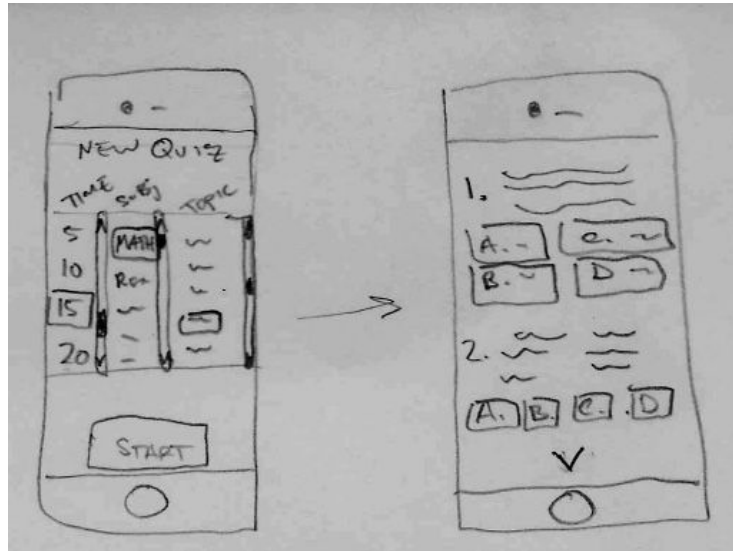


- **Track progress towards goal**
  - Users will be shown a percentage of subjects they have studied recently. They can click on each subject to view more details such as how long they have studied that subject, past test results, and which topics of the subject they have covered.
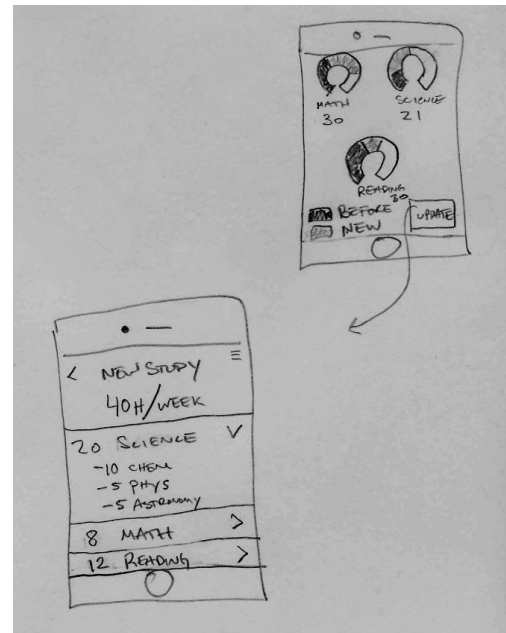
- **Determine what score is required to achieve your goal**
  - Users can fill out a form with their past experience to receive a score recommendation and set it as their goal.
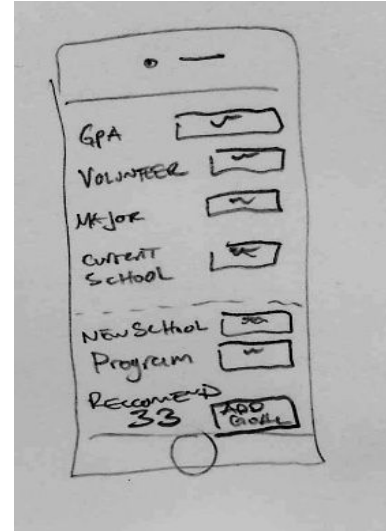


- **Adjust study plan to make sure the goal will be met**
  - Users will be able to take pictures of their practice tests so that they can be analyzed and help calculate how well you did on each topic. They will then be shown with their past results, goal projections, and what changes can be made to help improve their score even more.
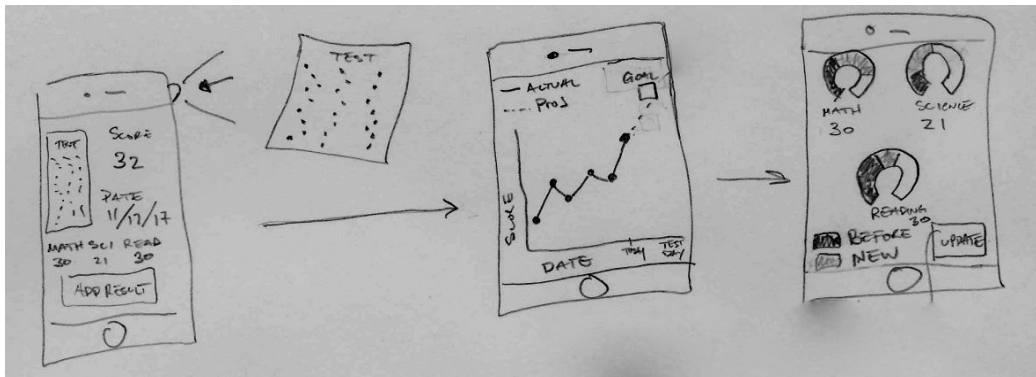
<u>Design 2 - AR Glasses</u>

This design focuses on tasks that could be made more intuitive by studying with AR glasses. Some advantages of studying with AR glasses are that the glasses can track what is being studied and use that information to track progress, formulate review quizzes, and easily display additional resources for any subject. Because AR glasses can incorporate the entire space the user is in, we can create helpful dashboards and gestures that are entirely customizable by the user to improve the studying process.

- **Track progress towards goal**
  - Progress is automatically tracked through glasses scanning what the user studies and the user's practice test results. When the user wants to look at their overall progress or progress on any given subject they can gesture by turning their head and then interact with the progress dashboard. The dashboard will show a breakdown of what the user has been studying, how long they have been studying, and how well they know certain topics based on review quizzes.
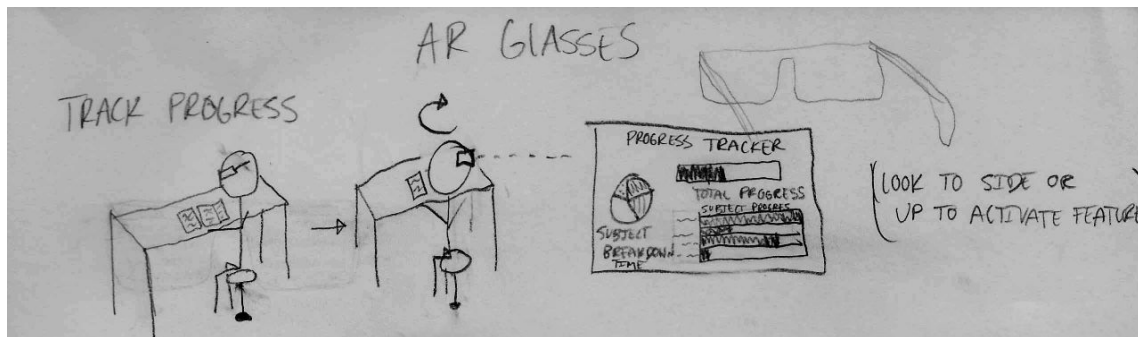


- **Decide what material to study each week**
  - The AR glasses will scan all material that you study, then at the end of each study session show the user what topics were covered in that session. The user can then decide whether to add these topics to their study guide for additional study by selecting the "Add to Study" button. Recap quizzes will also be available after study sessions to try and gauge what the user truly knows and doesn't in order to refine future study topics.
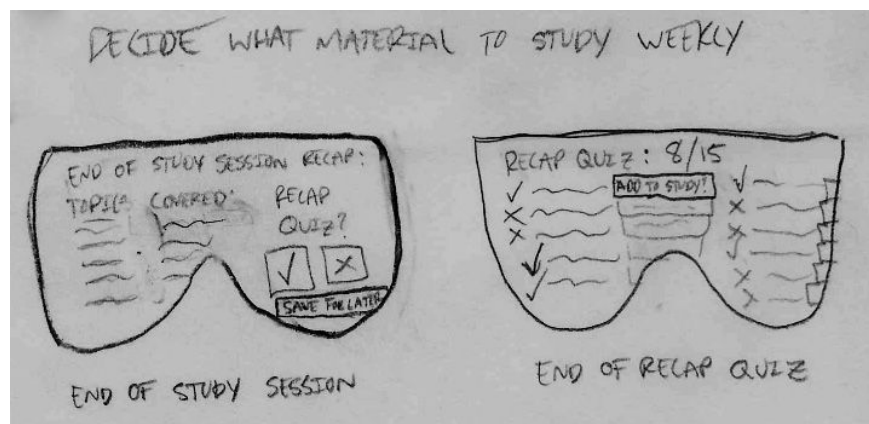
- **Make short study sessions effective**
  - By tracking practice tests, material studied, and recap quizzes the AR glasses can give users access to any material they have studied or need to study anywhere. Users can then select a subject and time limit to study and the AR glasses will display options for the user to study within their designated time limit.
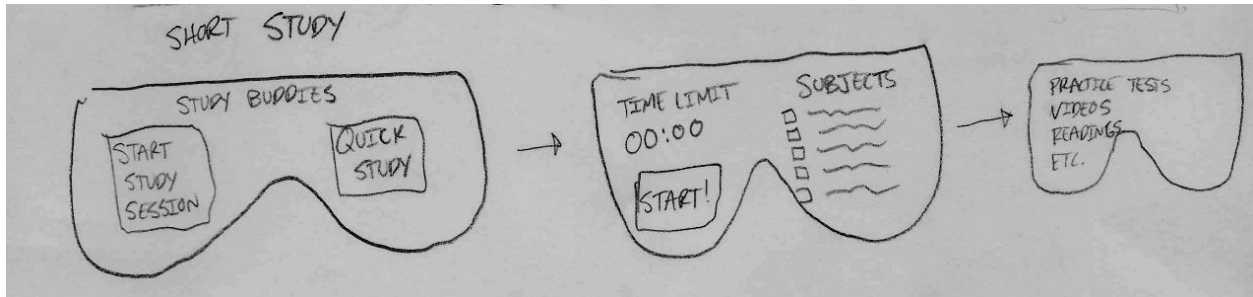


- **Search online for additional resources**
  - If a user is unsure about a word, topic, equation, etc they can gesture to the subject in question by pointing at it and an augmented dashboard will appear with online resources (articles, videos, definitions, etc.) related to that subject. The user can then select which resource they would like to review and the dashboard will display the related resource.
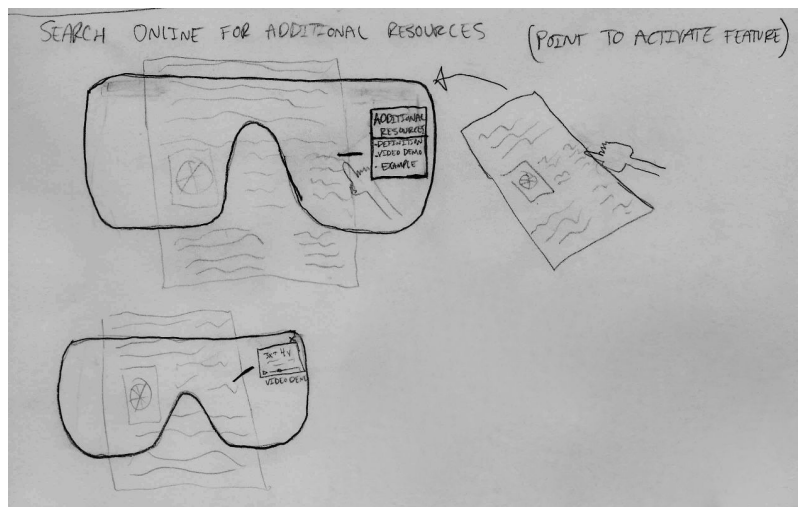
Design 3 - Study Pen

Mobile phones / tablets can often be distracting to use when you are trying to study. The idea behind this design is to keep you isolated from as many distractions as possible by providing a pen with the bare essentials for successful studies. This pen has multiple inputs and outputs. The inputs consist of sensors to record what you write, a camera, a microphone, and various buttons to communicate with the pen what you want it to do. Outputs are a speaker and a projector to display to the user their saved study topics, progress and examples of the topics they highlight.
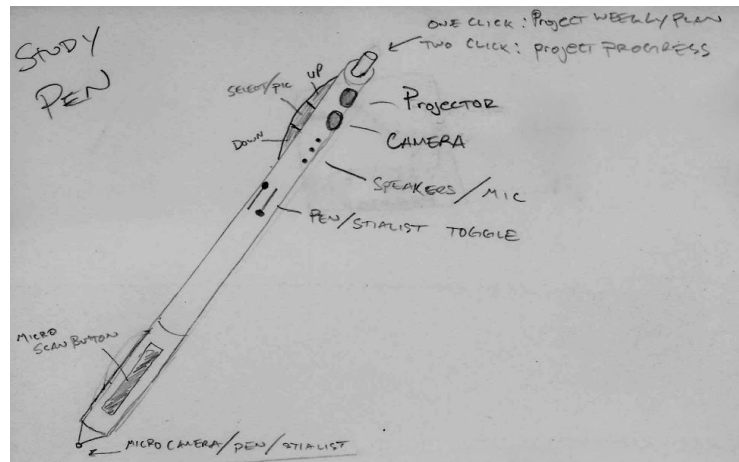


- **Decide what material to study each week.**
  - Holding the top button and saying "Add Calculus to next week" will do just what you requested. You can then click the top button once to be presented with your current weekly study topics.
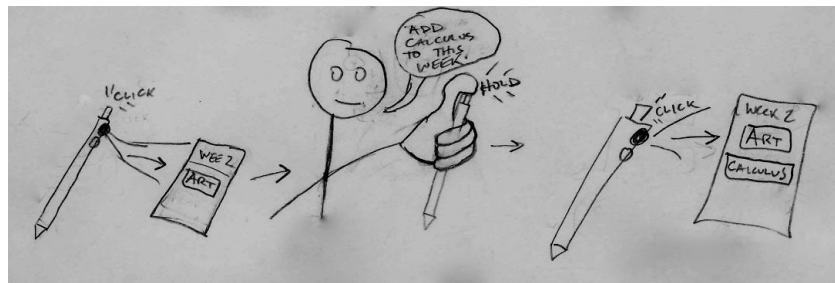


- **Track progress towards goal**
  - Double clicking the top button will display their current progress and estimated results. Users can use the camera of the pen to take a quick snapshot of a practice test or study material to add new scores, calculate results, and check off studied topics.
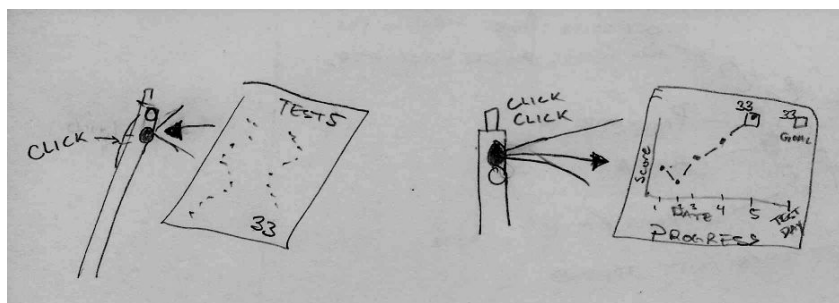
- **Search online for additional resources**
  - With the pen, users can click and hold the lower side button and highlight over the term and a definition will be projected out the pen onto their workspace. If they want more then a definition, they can simply double click and hold the lower side button and highlight over the term. This gesture will provide them with a list of search results & videos that they can then use the navigation buttons to select which example they want to view.
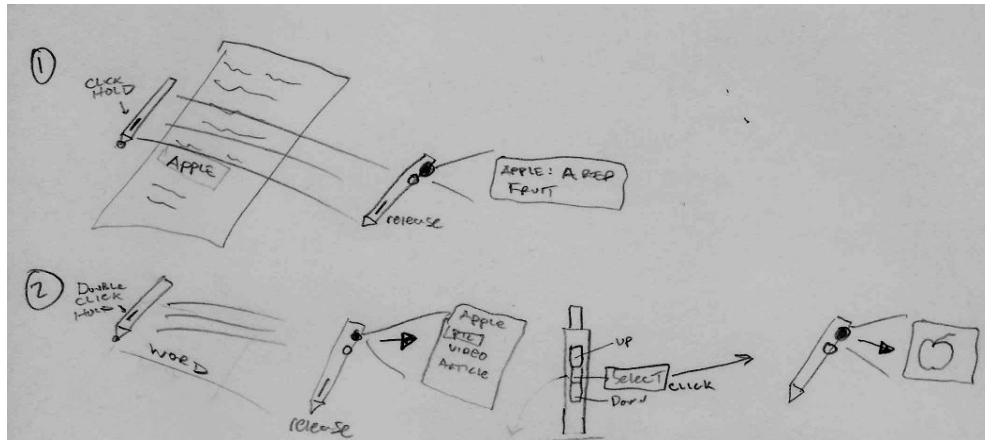


- **Make short study sessions effective**
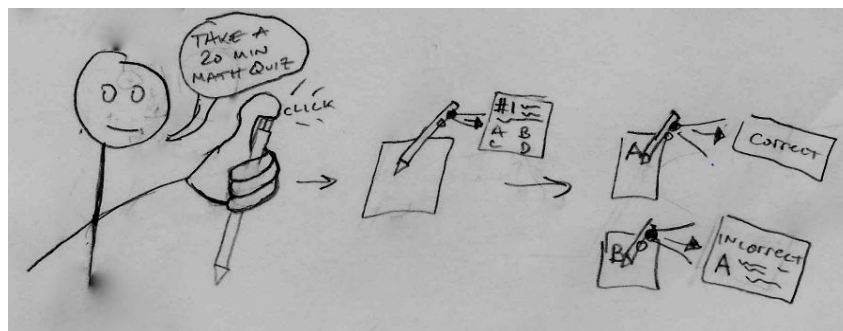


  - Holding the top button and saying "Take a quiz", the pen will continue to ask the user what topics and how long they would like to study. Once the user has completed the brief survey, the pen displays questions out of the projector and users answer them by writing the answer with the pen.

**Written Scenarios and Storyboards:**

Storyboard #1:

     Matt is taking a practice test at home with his study glasses on.  In order to help him improve his taste taking skills, the glasses give him a countdown time showing him that he should spend 45 seconds on this problem.  The glasses give him the advice to underline any negative or affirming words in the question, and they point out the word 'not' to him.  20 seconds later, the glasses can tell that he is still struggling on this problem.  The glasses then suggest that Matt crosses out any answers that he knows are incorrect, and he does so.  When the glasses see that Matt still has not decided, with only 5 seconds before the suggested amount of time for the question runs out, the glasses tell him to take his best guess on the problem, and mark it with a star so he knows to come back to it later.
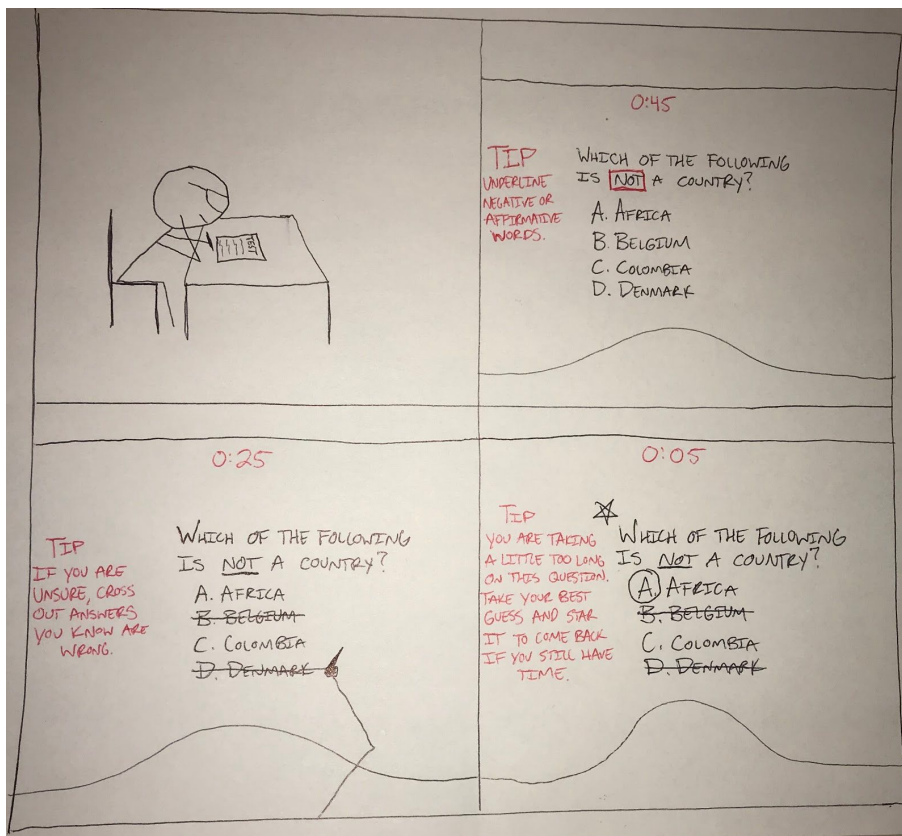
Storyboard #2:

Tamara is having trouble with a math concept she is studying.  Meanwhile, elsewhere Jeremy is struggling with studying english.  The glasses then pair them up for a peer to peer tutoring session.  Once they are paired, Jeremy can see in his glasses what Tamara is looking at, and he explains the math concept to her.  When that is completed, Tamara sees what Jeremy is looking at, and explains the grammar concept to him.