Lab 1 - Study Buddy Description

Mark Myers

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Mr. Thomas Kennedy

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1. Introduction

A study group consists of a small group of students who share similar goals and meet on some recurring basis to review material and prepare for exams. An acronym for study group is:

- S-Share Solutions
- G-Goal Oriented
- T-Test Others
- R-Respect Each Other
- U-Unite for Success
- O-Organize for Learning
- D-Don't Delay
- U-Understand the Process
- Y-You’re Not Alone Often
- P-Participate

Study Groups are invaluable to individuals who learn best through practice and repetition with others. Study groups help people learn, review, and study for courses or other material they need for success.

The main benefits apparent from study groups are: Sharing talent and knowledge, having more fun (while studying), motivating each other to stay focused, comparing and improving the participants’ own notes, giving and receiving motivation and support from each other and learning more in a shorter time, and often in a new and different way, facilitate better understanding of content.

Figure 1 is the current process flow. It shows the difficulty and time complexity involved in forming a study group. There are lots of turn backs, try agains, and waiting movements involved in the current process, with a lot of room for improvement.

- A user might post on a discussion board or ask another person if they are interested in forming a study group, if they receive a negative response they must try again, asking another person or waiting for someone else to reply to their post.
- If they first receive a positive response, they must try and schedule a meeting with the other person, trying to set up a time and location to meet. If the schedules do not match up, again they must go back and ask another person, or again wait for another response.
- If the schedules do line up, a study group may be formed. This whole process assumes that there are not any interpersonal conflicts, and if there are, the whole process must be started over again.

![Diagram of the Current Process Flow]

Figure 1: Current Process Flow

Study Buddy is the solution to the problem of forming a study group. Study Buddy is a way to change the long, difficult, and arduous process involved in forming a study group at this time. Study Buddy is a platform that helps students and people pursuing new knowledge find the perfect match for study groups to achieve success in their academics. Study Buddy emphasizes bringing together three types of students: online students, live students, and shy students. These three types have their own needs. Online students have a difficult time finding other students to meet with as they are not on campus and are not able to make
acquaintances to start a study group. In person students may have trouble coordinating schedules or finding others who want to study in a group. Shy students also have trouble as they may be too shy to ask anyone if they want to study, even if they really need help. Or it may be the shy student wants to study with others and get to know other people in their courses.

2. Study Buddy Product Description

The proposed process flow Study Buddy will use is Figure 2.

The proposed process flow improves on the current process flow because everyone the user is matched with:

1. already wants to be in a group.
2. already has the same availability as the user.
3. already are looking to study the same material.

Taking out large problem areas of the current flow, most of which involve waiting and often take too long and the user gets behind or misses the test they were trying to study for in the first place. The largest section of the proposed flow simply involves creating an account and/or entering the courses.
Lab 1 - Study Buddy Description

Figure 2: Proposed Process Flow

Study Buddy changes the current method of finding a study partner. Study Buddy takes all the work out of the current process of finding a study partner. With Study Buddy, the user no longer has to search for a ‘Buddy’ themself. The user does not have to look all over campus or social media searching for someone with which to study. The user does not have to try to match schedules with someone, and does not have to worry about being shy and talking to someone they do not know to find someone to study with. Study Buddy allows the user to enter their courses, their availability, and learning style, and finds a match based off the courses they want to study for and when they are available to study, as well as the learning style the user enters.
2.1. Key Product Features and Capabilities

Study Buddy matches users to other users who wish to form a study group. Study Buddy matches users with its Intelligent Buddy Matching algorithm. The algorithm matches users based on their learning style and assigns values to each learning style (1 or 0) and computes a compatibility score. Figure 3 is a detailed map of the algorithm.

The compatibility score then determines how well these two partners match up. Study Buddy then matches users based on their availability once it recognizes that they have a matching compatibility score. The explanation of the Intelligent Buddy Matching algorithm in Figure 3. Their availability is based on preferences to study in the morning, during the day, at night, rather they work or not and need to study with a partner after work hours.

This solves the major problem of finding a Buddy with which to study, this being, the awkwardness in searching and asking people if they want to be in a group, finding out they either:

1. can be in a group and turn out to not be a good partner or match or
2. finding out they would be a perfect match, and the availability just not being the same and unable to find a time that works best for both partners.
Another distinguishing quality of Study Buddy, is the integrated applications. Integrated in Study Buddy are: Google Drive, which enables sharing of documents between buddies; Google Hangouts, which enables communications and scheduling between buddies; Codeshare, which enables real time coding development; Jupyter Notebook, another way to share code, but it also allows for sharing equations and other forms that cannot be represented in plain text; Slack, which is used for communication, allowing buddies to create topic channels; and Git, which will allow buddies to upload and share their code repositories.
2.2. Major Components (Hardware/Software)

Study Buddy will use several different design patterns throughout the application code in order to ensure clean and concise code, as well as ensuring the design is well thought out, through the entire development process.

The Model View Controller (MVC) pattern will be the barrier separating the different component layers of the application. By dividing each component, the development process is accelerated. Some developers can work on the front end view while some others can work on the back end controller. With each developer code change there will be no impact on the others. Meaning a large change on the front end view will not wreck the entire application and brick the back end view.

The facade design pattern allows for the abstraction of business logic, which is often complex. The back end will be behind a false (or facade) interface. The purpose of this facade interface is to allow for methods which the front end developers can call, without needing to understand the complex business logic and how it is implemented. This includes complex database queries or external calls of the (Application Programing Interface) API.

The Data Access Object (DAO) provides all the querying logic involved with the database. This class is a doorway into the data persistence layer, which is a group of files, allowing for the communication between the application (Study Buddy) and the database it uses to store information. The main methods in the DAO will allow the querying and addition of information within the database.
The foundation of Study Buddy, as an application, will rest on is, Java Server Faces (JSF) Framework. The JSF framework allows for a modern user interface and design. Improving the user experience and allowing for a smoother application. JSF uses facelets and this allows page templating, which allows the design to be reused, resulting in consistency throughout the user interface. JSF also allows for expression language, that eases flow between the application and the server.

Java Persistence API (JPA) allows for the implementation of object-relational mapping, which allows an object oriented (OO) language (C++/Java) to communicate with the database. Meaning Study Buddy can be written in an OO language and still make database calls. JSF will also allow the Entity annotation, a class marked to a table in the database (such as student). JSF also creates tables inside the database from the fields of entity classes. The entity manager and its supplied method make basic operations, like CREATE, READ, UPDATE, and DELETE less costly to implement.

Figure 4: Major Functional Components Diagram
3. Identification of Case Study

The current method available to ODU student is “ODU Find a Study Group” (figure 5) it is little more than a digital corkboard with little functionality or planning and none of the buddy matching features, scheduling syncing, or integration Study Buddy will have.

Figure 5: ODU Find a Study Group webpage

Universities will be the main customers for Study Buddy, they will have it available similar to BlackBoard on their Portals. Undergraduate programs can also recommend Study Buddy to help study for MCAT, PCAT, and GRE testing required for entry into graduate programs. Organizations will also be potential customers allowing them to organize study groups for licensures such as A+, Bar Exam, CPA, CMA, and other professional certifications. High Schools will also be potential customers, allowing them to help their own students organize study groups not just for their high school course work but as well as SAT/ACT college admittance testing.
End Users of Study Buddy will be mostly students. Students will use Study Buddy if they are online students, live students, shy students, students looking for the best fit for a study group, students who wish to discuss topics more in depth for introductory courses, or even students who wish to review material they learned in previous semesters. Additional users will be anyone pursuing knowledge and wanting to study it with someone else to gain more knowledge.

4. Study Buddy Product Prototype Description

The goal is to achieve a working version of Study Buddy with the prototype with one or two integrated applications. The Study Buddy prototype capabilities will be slightly reduced, with no private messages, ability to block ‘bad’ buddies, or scheduling syncing with a buddy right away. Study Buddy will not include in the prototype slack integrations or codeshare integration. The complete table is labeled Table 1.

4.1. Prototype Architecture (Hardware/Software)

Figure 4 shows the Major Functional Components Diagram (MFCD) used in the prototype architecture, very similar to the major components in section 2.2. The major components will be the end users, the devices they use, JSF, and the database.

The Model View Controller (MVC) decouples separate components and allows for quick parallel development of the application. The Facade creates a forward facing interface to hide complex business logic from the front end development. The Data Access Object removes the data layer from the rest of the application and disguises the CRUD (Create, Read, Update, and Delete) operations and query statements.
Java Server Faces (JSF) is the foundation for Study Buddy and supports an expression language allowing for communication between the front end view and back end server. Java Persistence API (JPA) defines object-relational mapping for persistence of objects to tables in the database. Tables are modeled from entity classes are just Java classes. JPA supplies the mechanisms for SQL query construction.

Google Hangouts will be the only integrated application in the prototype with more features integrated to follow after the prototype is successfully developed. Google Hangouts will be the proof of concept for integration into the Study Buddy application.
4.2. Prototype Features and Capabilities

The final product version of study Buddy will have some features not present in the prototype. The listing is in Table 1 which gives a thorough explanation of the GUI and features available in both the final product and the prototype.

<table>
<thead>
<tr>
<th>Features</th>
<th>STUDY BUDDY Final Product</th>
<th>STUDY BUDDY Prototype</th>
</tr>
</thead>
<tbody>
<tr>
<td>GUI</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Login</td>
<td>Allows user entry of authentication credentials</td>
<td>Will be implemented</td>
</tr>
<tr>
<td>New User</td>
<td>Allows a user to create an account</td>
<td>Will be implemented</td>
</tr>
<tr>
<td>Study Preference Setting</td>
<td>Allows users to set study preferences for intelligent buddy matching algorithm</td>
<td>Will be implemented with limited study preference fields</td>
</tr>
<tr>
<td>Search for buddies</td>
<td>Allows user to search for study buddies</td>
<td>Will be implemented</td>
</tr>
<tr>
<td>Create a study group</td>
<td>Allows user to create a study group</td>
<td>Will be implemented</td>
</tr>
<tr>
<td>Set wait time</td>
<td>Allows user to set wait time in case of no matched buddies found</td>
<td>Will not be implemented</td>
</tr>
<tr>
<td>Web Application</td>
<td>The way in which the user will interact with the Study Buddy application using a web browser</td>
<td>Will be implemented</td>
</tr>
<tr>
<td>Mobile Application</td>
<td>The way in which the user will interact with the Study Buddy application using their smartphone device</td>
<td>Will not be implemented</td>
</tr>
<tr>
<td>Private Message</td>
<td>Allows users to send and receive private messages within the Study Buddy App</td>
<td>Will not be implemented</td>
</tr>
<tr>
<td>Block buddies</td>
<td>Allows users to block buddies with different goals</td>
<td>Will not be implemented</td>
</tr>
<tr>
<td>Partner match by subject of interest</td>
<td>Matching Study Buddies by their own subject interest</td>
<td>Will be implemented</td>
</tr>
<tr>
<td>Intelligent Buddy Matching</td>
<td>Matching Study Buddies with the proprietary algorithm</td>
<td>Will be implemented</td>
</tr>
<tr>
<td>Google Hangout Integration</td>
<td>Allows users to integrate their Google Hangouts accounts for setting meeting times and web conferencing</td>
<td>Will be implemented</td>
</tr>
<tr>
<td>Google Drive Integration</td>
<td>Allow users to share documents</td>
<td>Will not be implemented</td>
</tr>
<tr>
<td>Slack Integration</td>
<td>Allows users to integrate their Slack accounts, allowing channels to be made to aid in communication between Study Buddies</td>
<td>Will not be implemented</td>
</tr>
<tr>
<td>Git Integration</td>
<td>for creating repositories to share with your study buddies</td>
<td>Will not be implemented</td>
</tr>
<tr>
<td>Codeshare integration</td>
<td>Allows users to share their code real time with their Study Buddies</td>
<td>Will not be implemented</td>
</tr>
<tr>
<td>Schedule syncing with “Buddy”</td>
<td>Allows users to make matches with Study Buddies based on the availability they input</td>
<td>Will not be implemented</td>
</tr>
<tr>
<td>Rate your buddy</td>
<td>Allows users to provide feedback on their Study Buddies</td>
<td>Will not be implemented</td>
</tr>
</tbody>
</table>

Table 1: Prototype Features
4.3. Prototype Development Challenges

Language unfamiliarity may be a challenge, a manageable one, but a potential challenge nonetheless. Not all the developers will be comfortable programming in the language used to develop Study Buddy, but all are capable and will help each other as needed. Not everyone is familiar with Java Server Faces, but we have a trained team member in that area who will be able to assist as well as others learning by practice. The new development platform can be a challenge, but again, the team can help each other where needed and learn during development. The team will become more comfortable as they develop the product.
5. Glossary

**Auditory Learner** - best comprehend information by listening to information rather than reading it or seeing it visually.

**Business Logic** - The programming that manages communication between an end user interface and a database.

**CRUD** - Stands for Create, Read, Update, and Delete. Basic database/application operations.

**Entity Class** - A simple Java Class with member variables and getter and setter methods defined.

**JPA** - Java Persistence Application Programming Interface is an API for handling all database operations such as storing or retrieve entities from the database.

**JSF** - Java server faces is a java framework that couples the view and servlet into one managed component.

**Kinesthetic Learner** - best comprehend information by participating in activities or solving problems in a hands-on manner.

**ORM** - Object-relational mapping. Technique for persisting objects into a database table. Tables are modeled after Entity classes.

**Procrastination** - delaying or postponing a task, which needs to be completed, often to the detriment of the procrastinator.

**Prototype** - the prototype of Study Buddy will be a reduced scale version of the final product, and will demonstrate the functionality of the completed product in a simulated environment.

**Reading/Writing Learner** - best comprehend information by reading texts to further absorb information by condensing and rephrasing it in traditional lecture and note-taking environments.

**Study Group** - a small group of students with similar goals who meet regularly to review course material and prepare for exams.

**Visual Learner** - best comprehend information by visualizing relationships and ideas through maps, charts, diagrams and even essays.

**Web Application** - an application that uses a website as the interface.
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