Lab 1 - Study Buddy Description

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1. Introduction

Study Buddy will be a platform designed to help anyone pursuing knowledge, especially Students, find ideal matches to form a successful study group using online collaboration tools. The Student Success Center defines a study group as “a small group of students with similar goals who meet regularly to review course material and prepare for exams.” According to the website education corner, there are many benefits to join a study group. Key benefits include utilizing individual talents, sharing knowledge, and motivating each other to stay focused and engaged. Keith Sawyer (2013), a professor at Washington University, conducted a study where he compared college students in study groups versus in a classroom setting. He noticed that when they took notes during the lecture classes, they were so busy writing that it was hard for them to really absorb the material. In study groups, however, they consistently seemed more engaged. Through these interactions he identified that students could better absorb the lecture notes. From these observations, Sawyer remarked “Study groups are so effective because they provide a way for students to make the lecture notes their own”.

As depicted in Figure 1, forming a study group can often be difficult for students. This is especially true for online students and shy students. Shy students feel uncomfortable approaching other students and asking for help. Online students often utilize online discussion boards, but that does not always provide constructive responses. Even though a student may find someone who is interested in forming a study group, setting up a time and place can be challenging. Having people join a study group does not always mean it will be a successful study group. When students join a study group, they often have different motives. For example, some students might want to get a head start on an assignment while others just want to meet a deadline. Students also
have different responsibilities such as, family or work. Moreover, individual study habits can affect the success of a study group. Different students often have different learning styles and preferences. These preferences can be visual, auditory, kinesthetic, or written.

![Figure 1: Current Process Flow](image)

One could conclude that a study group is considered to be most successful when everyone participates and benefits. The Study Buddy application will make forming a successful study group easier. As illustrated in Figure 2, Study Buddy will simplify the process of forming a study group. Once a person wants to form a study group, that person will simply access the Study Buddy application.

If the person is a new user, a new profile must be created with study preferences. However, if the person is an existing user, the person will simply log on to the system. By selecting “Find a Study Buddy”, the system will prompt the user to specify the class, subject, or
topic of the intended study group. The system will then search for people looking for a study buddy with the same search criteria. The Intelligent Buddy Matching algorithm will then be used to find a perfect study buddy for the user.

Figure 2: Proposed Process Flow

Study Buddy will primarily be a web application as its main platform, since it can be easily accessed via many devices with internet access. Due to the popularity of smart devices such as mobile phones and tablets, Study Buddy will also be available as a smart device application. Current applications on the market only match buddies based on topic of interest. Study Buddy, on the other hand, will use the Intelligent Buddy Matching system which can better match study buddies, based on user preferences and study habits. No other applications currently integrate any online collaboration tools. Study Buddy is unique in that it will integrate some external services such as Slack, Google Hangouts, Codeshare, Google Drive, Jupyter Notebook, and Git to facilitate online study groups.
2. Study Buddy Product Description

The Study Buddy application will include two main components: a computer or a mobile device with internet access and a database server infrastructure as previously illustrated in Figure 2. Instead of trying to ask around or create a post on discussion board, end user will conveniently use a computer or a mobile device with internet connection to access Study Buddy. The database server infrastructure will then store the user’s information and process the data. The received data will in turn be displayed on the end user’s computer or mobile device.

2.1. Key Product Features and Capabilities

The Study Buddy application aims to help students find the right study partners. This means Study Buddy will match users based on class, subject, or topics of interest. Another option that users have is using Study Buddy’s unique intelligent buddy matching algorithm. The Intelligent Buddy Matching Algorithm (shown in Figure 3) performs the following steps:

1. The algorithm will find similarities between the searcher and their potential matched buddies.
   a. The system will compute a similarity score of each study preference between the searcher’s and the possibly matched buddies.
   b. The similarity score is the sum of the result from computing cosine of an angle between 2 vectors.
   c. The higher similarity score directly correlates between the similarity they will have.

2. This similarity score will be used to sort the potential buddy match list in descending order to help the searcher making decision when inviting someone to join the study group.
Figure 3: Intelligent Buddy Matching Algorithm

While some people prefer study with people of a high similarity, others may feel a diverse group is more advantageous. The users have an option to remark buddies who are not sharing the same interests for future reference when deciding to join the study groups. The "Rate your buddies" feature serves as a similar purpose. It will allow users to rate the previous study partners.

To facilitate online study groups, Study Buddy will make use of several external services namely Google Drive, Google Hangout, Codeshare for real time development, Jupyter Notebook, Slack for private messaging and video/voice calls, and Git repository. To protect user privacy, only someone's username and profile picture (which is optional) will be displayed publicly. Even then, only those matched with a user will be able to see this information. Additional personal info such as phone numbers and email addresses will only be shared if the users desire.
2.2. Major Components (Hardware/Software)

As shown in Figure 4, there will be three main components for Study Buddy application. Computer or a mobile device with internet connection will be used to access Study Buddy application. The Study Buddy application will be offered as web application as well as mobile application. To better facilitate online study groups, Study Buddy will integrate external services for online collaboration.

![Diagram](image)

Figure 4: Major Functional Components Diagram

Several design patterns will be used in Study Buddy application development to ensure that the code will be clean and concise. For example, the Model View Controller pattern (MVC) will be used to allow the developers to work in parallel. The façade design pattern will be used to handle the complexity of backend business logic. The Data Access Object will take care of the database querying logic.

Study Buddy will be built on the framework of Java Server Faces which will provide a solid and modern user interface design. It also supports expression language that allows easy flows of data back and forth between user displays and the database server. To handle the problem of data persistence, an application programming interface or API will be used to implement object-relational mapping techniques. The API supplies the entity annotation that
marks classes that need to be saved in a database. It also creates the tables inside of the database from the fields of the entity classes. The entity manager and its supplied methods make basic database operations such as Create, Read, Update, and Delete simple and easy to achieve. Microsoft’s SQL Server Management Studio will be used as the Study Buddy database management system. With the database management system, Study Buddy users will be able to create, read, update and delete data in a database. Glassfish Server will be used to deploy the web application. As a web application server, Glassfish will be handling requests from web browsers. It also provides interactive administrative console which will allow the administrator to easily test the web services.

3. Identification of Case Study

The main customer target of Study Buddy application will be universities. Universities have a large number of both online and shy students. The “ODU Find a Study Group” is an online notification board which doesn’t require any credentials. Old Dominion University could replace the “ODU Find a Study Group” with Study Buddy. Once access the board, the system displays a message “Need a study group? Post your name, your email address, and the course(s) you're taking this semester. Browse through the wall and connect with others taking the same classes” as shown in figure 5. This creates a quality control issue with the system, since anyone can post unverified content on the board such as text, hyperlinks or videos. It also does not provide security measures that protect users’ personal information. Given the shortfalls of “ODU Find a Study Group” and other applications like it, there is a demand for this kind of application. Study Buddy is a better replacement for these applications because it offers more functionality as well as better personal information protection of users.
Any organizations that requires certifications or licenses will also find Study Buddy application to be useful. High schools could also be a potential user of Study Buddy, since it can be used as a tool to help students study for SAT/ACT testing. In short, Study Buddy is an ideal application for any organization that has a requirement for studying or learning.

Figure 5: ODU Find a Study Group webpage

4. Study Buddy Product Prototype Description

Due to time limitations, the Study Buddy application prototype will be developed as a web application only. All major algorithms, and selected core features will be implemented with limited options.

4.1. Prototype Architecture (Hardware/Software)

The prototype architecture will consist of the three main components that will be seen in the real-world product. Figure 2 which is the figure of Major functional components can be found on section 2.2 as well as the details of the application architecture.
4.2. Prototype Features and Capabilities

Prototype features will be scaled for the final product. Some features and algorithms will be eliminated due to time constraints. The prototype will perform study buddy matches via the finder on a limited number of study preferences along with external service integration. A complete list of features is available in Table 1.

<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><strong>Login</strong> Allows user entry of authentication credentials</td>
<td>Will be implemented</td>
</tr>
<tr>
<td></td>
<td><strong>New User</strong> Allows a user to create an account</td>
<td>Will be implemented</td>
</tr>
<tr>
<td></td>
<td><strong>Study Preference Setting</strong> 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></td>
<td><strong>Search for buddies</strong> Allows user to search for study buddies</td>
<td>Will be implemented</td>
</tr>
<tr>
<td></td>
<td><strong>Create a study group</strong> Allows user to create a study group</td>
<td>Will be implemented</td>
</tr>
<tr>
<td></td>
<td><strong>Set wait time</strong> Allows user to set wait time in case of no matched buddies found</td>
<td>Will not be implemented</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Features</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Web Application</strong> 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></td>
<td><strong>Mobile Application</strong> 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></td>
<td><strong>Private Message</strong> Allows users to send and receive private messages within the Study Buddy App</td>
<td>Will not be implemented</td>
</tr>
<tr>
<td></td>
<td><strong>Block buddies</strong> Allows users to block buddies with different goals</td>
<td>Will not be implemented</td>
</tr>
<tr>
<td></td>
<td><strong>Partner match by subject of interest</strong> Matching Study Buddies by their own subject interest</td>
<td>Will be implemented</td>
</tr>
<tr>
<td></td>
<td><strong>Intelligent Buddy Matching</strong> Matching Study Buddies with the proprietary algorithm</td>
<td>Will be implemented</td>
</tr>
<tr>
<td></td>
<td><strong>Google Hangout Integration</strong> Allows users to integrate their Google Hangouts accounts for setting meeting times and web conferencing</td>
<td>Will be implemented</td>
</tr>
<tr>
<td></td>
<td><strong>Google Drive Integration</strong> Allow users to share documents</td>
<td>Will not be implemented</td>
</tr>
<tr>
<td></td>
<td><strong>Slack Integration</strong> 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></td>
<td><strong>Git Integration</strong> for creating repositories to share with your study buddies</td>
<td>Will not be implemented</td>
</tr>
<tr>
<td></td>
<td><strong>Codeshare integration</strong> Allows users to share their code real time with their Study Buddies</td>
<td>Will not be implemented</td>
</tr>
<tr>
<td></td>
<td><strong>Schedule syncing</strong> Allows users to make matches with Study Buddies based on the availability they input</td>
<td>Will not be implemented</td>
</tr>
<tr>
<td></td>
<td><strong>Rate your buddy</strong> 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

Many of the team developers have limited experience with web application development. The developers will require some time to get familiarized with the concepts of web application development. The new concepts also include design patterns and the Agile development model. The team also has very limited number of team members with more advanced programming experience. Moreover, some developers have limited experience with the Java programming language, which will be the core language of the prototype development. Some tools that are new to many developers will also be used during the prototype development including, Glassfish Server and Microsoft SQL Server Management Studio. In conclusion, the prototype development process will need to mitigate the several challenges that include lack of familiarity with current development tools, concepts, and programming languages. Fortunately, these challenges can be overcome by training and educating less experienced team members.
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

**Learning outcomes** – statements that identify the knowledge, skills, or abilities learners should gain by the end of a particular assignment, class, course, or program.

**Modern Interface Design** - the process of making manageable interfaces for computing devices, with a focus on current styles.

**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
6. References


Codeshare information, Retrieved September 12, 2018, from: https://codeshare.io/


Forgetting All Your Coursework, Retrieved September 16, 2018, from: https://www.blackboard.odu.edu/webapps/discussionboard/do/message?action=list_messages&course_id=_323209_1&nav=discussion_board_entry&conf_id=_351171_1&forum_id=_309142_1&message_id=_7348213_1

Google Meet information, Retrieved September 12, 2018, from: https://support.google.com/a/answer/7303775?hl=en

ODU Find a study group, Retrieved January 29, 2019, from: https://padlet.com/sscinstruction/odufndastudygroup


Slack Information, Retrieved September 12, 2018, from: https://slack.com/
