ONLINE STUDENT PEER TO PEER COACHING SYSTEM

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ONLINE STUDENT PEER TO PEER COACHING SYSTEM

KHAALID SUBAAN BURAALEH

A thesis submitted in fulfilment of the

requirements for the award of the degree of

Bachelor of Computer Science (Software Engineering)

School of Computing

Faculty of Engineering

Universiti Teknologi Malaysia

Date

DECLARATION

I declare that this thesis entitled *“Online Student Peer To Peer Coaching System* *”* is the result of my own research except as cited in the references. The thesis has not been accepted for any degree and is not concurrently submitted in candidature of any other degree.

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DEDICATION

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ACKNOWLEDGEMENT

ABSTRACT

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ABSTRAK

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LIST OF ABBREVIATIONS

|  |  |  |
| --- | --- | --- |
| OSPTPCS | - | Online Student Peer to Peer Coaching System |
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# INTRODUCTION

## Overview

Peer to Peer Coaching in the education system refers to peers guiding each other in a more informal, warm interaction in order to help each other to improve ( Barbara 2000).In peers, it can be regarded as teachers guiding teachers or students guiding students. Peer to Peer coaching, in this instance, deals with students guided by their peers who have experiences and competence to coach topics(Joyce, Robin, Brewer, Melanie, Reid and Barbara 2003). Coaching helps students better grasp their goals and the direction they wish to take(Eric and Rachel, 2014). A study shows that students who take coaching cope better in attending university; besides students benefiting from coaching, the coachee benefits from improving their communication and conveying the information towards the student (Christian and Chloe 2013). This leads to better communication skills. Unfortunately, no system has implemented this peer to peer coaching approach on a large scale.

Therefore, ONLINE STUDENT PEER TO PEER COACHING SYSTEM is proposed to provide the lack of a platform to communicate and interact with peers.

## Problem Background

In recent years, there is an increase of students applying for universities; however, the graduates seem to get smaller and smaller (Christian et al. 2013). Some say that it is because of a lack of structure, and students are unsure how to find a path to graduate (Judith 2011). A survey showed that students are more likely worried about the future after graduation (Helen 2013), causing prolonged distress and anxiety. Some students may try to solve the problem by taking additional courses to help some particular topics. They are either free or paid courses, and most courses that discuss the topic more in-depth, inclined to be more of a paid course.

Moreover, in those courses, students are not sure whether the teacher is explaining the topic well, and that might cause students to hesitate, and due to this, not taking the course at all. Besides quality issues, nowadays, there is an abundance of online courses that explain a topic in different ways in which requires the student to be selective and hope it leads to the right path. This leads to the same problem we mentioned (Judith 2019), where students are overwhelmed and do not have a well-defined structured approach.

While university institutes are struggling with students not graduating due to an undefined structure path in this fast-paced era(Christian et al. 2013), some of the educational institutes are thriving with the implementation of the coaching system. Coaching helped those students in those particular educational institutes guided by senior students who understand and empathize with their fellow students. This peer to peer coaching system leads to a better performing student both psychologically and academically(Passmore and Brown, 2009). Other than students who perform better, student coaches learn to develop leadership and better communication( Christian et al. 2013).

Although peer to peer coaching has been implemented in some institutes such as primary schools(Mary and Christian 2010), it has yet to reach the market in the university institution. Using coaching in university would have solved the problems such as lack of structure and anxiety about the future. Furthermore, in addition to solving the problems mentioned, it would create a culture students strive towards learning more and coachee learn more about the topic to improve communication with the student(Devine, Meyers and Houssemand 2013). Unfortunately, it is difficult to enforce all universities to implement the coaching system.

## Project Aim

To develop an online peer to peer student coaching system that aids university students in their education by providing courses taught by their peers from all around the world.

## Project Objectives

The objectives of the project include :

1. To elicit specific requirements for OSPTPCS
2. To design the related architectural models, databases, and user interfaces for OSPTPCS.
3. To develop OSPTPCS based on elicit requirements and designed models.
4. To test OSPTPCS using suitable testing techniques.

## Project Scope

The project scopes of this proposed project are states as follows :

* 1. There are several services delivered by OSPTPCS, which include applying as a coach, adding course categories, adding departments for an institute, validating course, and coach transactions using blockchain.
  2. The users of the proposed coaching system are university students
  3. The system will not cover the video recording system but will encourage third-party applications (such as live meetings, i.e., WebEx or recording links, i.e., YouTube).

## Project Importance

Through the utility and usage of OSPTPCS, students are able to find a platform for guidance and suggestions from students who are able to help. In addition, the platform provides an incentive for students to learn more, improving their studies.

## Report Organization

This thesis contains, excluding the appendices, five chapters: Introduction, Literature Review, System methodology, Requirement Analysis and Design, and Conclusion.

The Introduction consists of the general thesis overview, discussing the background problem, and the proposed solution.

Chapter 2, Literature Review, explains the proposed project further, comparing different systems that students currently use.

Chapter 3, System methodology, will explain which methodology the project is going to use. This will be based on the requirements and the proposed system structure.

Chapter 4, Requirement Analysis and Design, will discuss the proposed system requirements and design architecture analysis. Also, it will address how the system will be tested.

Lastly, concluding with the chapters, chapter 5 covers the project's achievements and considers suggestions for future improvements.

# LITERATURE REVIEW

## Introduction

Chapter 2 will discuss the current study operation for students to learn based on a survey made. In the later part of the chapter, current systems similar to the proposed system that students tend to use will be discussed. Furthermore, the strength and weaknesses will be compared with the proposed system that will be developed.

## Current System Analysis

In this part of the chapter, the survey that has been provided to analyze the current operations of a student, will be discussed and further elaborated in a swimlane diagram.

### Survey

A survey has been made using online tools and distributed using social applications. Around 100 forms have been received, receiving answers regarding the way they study, satisfaction of the way it is currently made and so on.

#### Respondents Background

The survey targeted students from higher education institutes containing various departments such as computing, chemical and mechanical department. The students ranged from bachelor degrees to PhD degrees.

#### Current Student Operation

Based on the survey responses, a swim lane has been drawn to display the current students' operation of finding answers based on their questions.

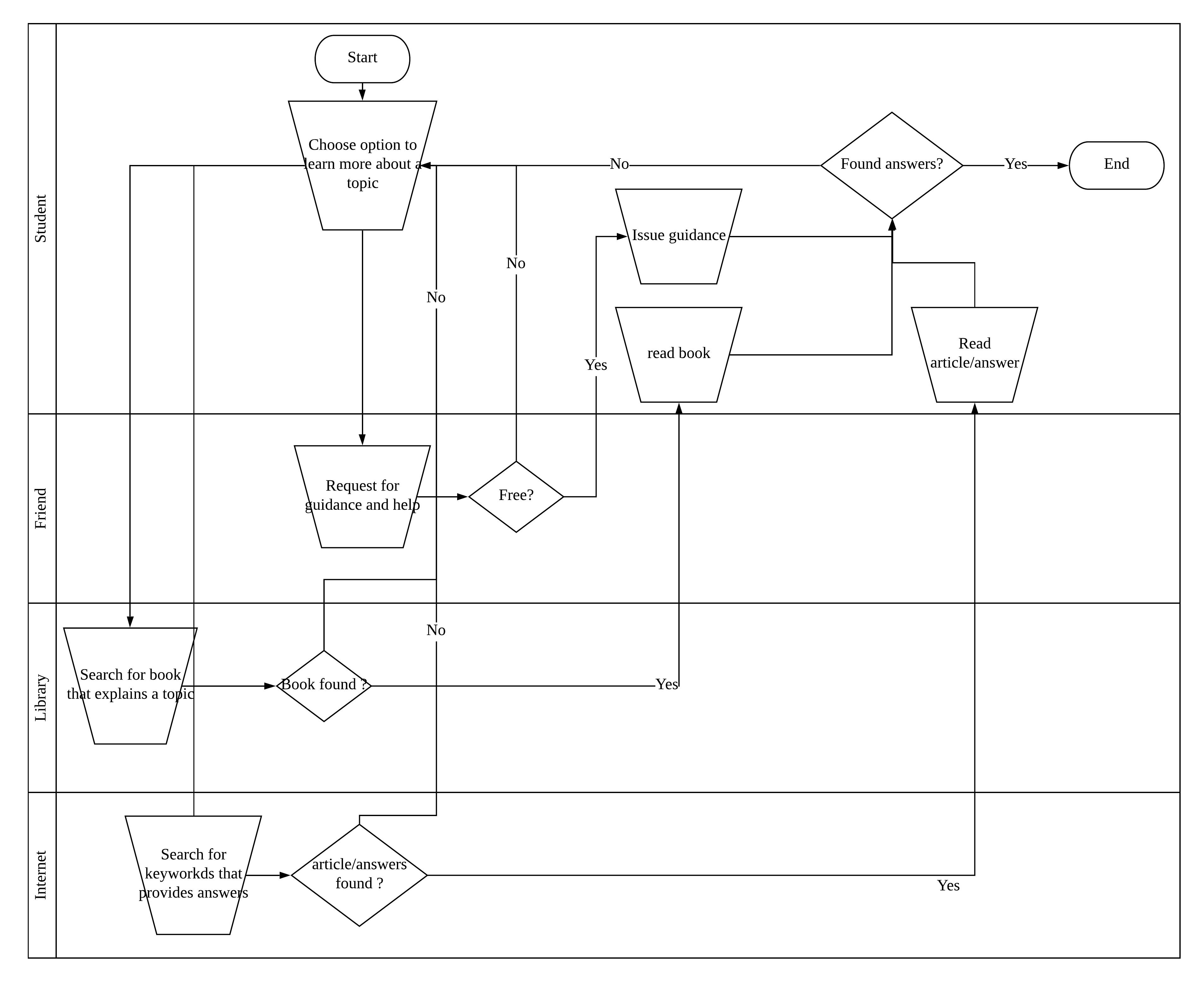


Figure 2.1 Swimlane Diagram for As-Is Student manual operations

As figure 2.1 describes, students usually take three different types of approaches in learning new information. Learning from a book, friend, lecturer, or internet has a similar flow whereby a student wishes for some answers for a particular topic. It requires searching for the answer after reading the chosen medium. After careful reading, the student can continue searching for the answer or, if the student found it, complete the operation cycle.

#### Degree of Satisfaction on the current operations based on the survey

Based on the survey, students have been asked the degree of satisfaction of how they study, and most students were agreeing that it is giving an unsatisfying answer.

In addition, students requested that things should be changed the way a student studies

## Comparison between existing systems

In this part of the chapter, the current systems will be described and compared with the proposed system. Three existing systems that some students use has been chosen.

### Udacity

Udacity (Thrun and Stavens, 2011) is an online education organization that contains many courses that have been well crafted and designed for students. The courses have several selected modules that equip students with the skills to get a job. In addition to a well-designed course, students will receive a certificate approved by well-known companies at the end of each course.

As mentioned above, the system contains many courses that range from different categories. To prevent courses from being cluttered, and students overwhelmed, the system grouped similar courses and described each learning path's outcome.

### Chegg Study

Chegg Study(Phumbhra, Rashid and Carlson,2005) is an online education system, helping students in their math courses by answering questions students had trouble finding answers. The system also aids in writing, checking the students' work, and giving some suggestions.

### Preply

Perply(Bigai, Voloshyn and Lukianov, 2012) is an online tutoring system with many quality tutors teaching specific subjects. Students who wish to take some lessons from a tutor could book a time with the selected tutor and get one to one lessons from the tutor. This helps students to further their understanding of particular topics.

### Comparison between the systems and OSPTPCS

Table 2.1 Comparison Between Systems And OSPTPCS

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Systems** | **Guiding students** | **System medium** | **Course Quality** | **coaching** | **Can be used in different institutes** | **Question and Answer Forums** |
| **Chegg study** | No | Online | - | No | Only specific subjects available | Yes, but paid |
| **Udacity** | Yes | Online | Yes | No | Only meant for computer science | No |
| **Preply** | yes | online | Yes | Tutors students | Only specific subjects available | No |
| **OSPTPCS** | Yes | Online | yes | Peer to peer | Can be implemented in any institute | Yes |

As table 2.1 depicts, all systems can be used online; however, the other features availability varies.

For Chegg study, students will be answered based on their questions; however, only after the student has paid a membership fee. While it does give questions and answers, the system does not have a feature that guides students in topics. Also, the system does not have lessons or courses.

Udacity has more than half of the features that a student might require, such as guiding students by showing a structured path to follow or having courses that are monitored to maintain quality. However, including the lack of question and answer forum, the system focuses only towards students who are interested in computer science.

Perply is one of the systems that ticks most of the features, satisfying most of the students. Be it in guiding a student, quality of the lessons or tutoring a student, and the system gives a strong base for students. Unfortunately, the available courses are only the most trending ones, neglecting students who are in a different department.

In addition to the already available features from the current systems, the proposed project, OSPTPCS, will also solve the lack of peer coaching, the inflexibility of not being used by different institutes, and a platform where students could get their answers from.

## Chapter Summary

This chapter has described the current operations and currently available systems that students use similar to the OSPTPCS. Moreover, it has been compared for what each available systems provide and its disadvantages towards the proposed system.

# SYSTEM DEVELOPMENT METHODOLOGY

## Introduction

In this chapter, the methodology will be discussed and reasoned for the proposed system and later elaborated. It will also label and explain each technology that will be used and system requirements for the proposed system to function.

## Methodology Choice and Justification

In this part of the chapter, the types of methodologies that were selected will be briefly reviewed and later will be mentioned which methodology has been chosen.

### Selected Methodologies

The chosen methodologies are agile development, rapid application development, the v-model approach, and waterfall development method.

#### Agile Development

Agile development is an incremental method, where it solves the problem of the rapidly changing environment (Sommerville, 1982). In order to adapt to the fast-paced environment, businesses need to produce products quickly without losing their quality. Unlike traditional methods, where it requires much documentation, the agile methodology minimizes the documentation and emphasizes results first (Sommerville, 1982). This requires a great deal of communication with the end-users, involving the stakeholders in planning the system. This benefits the system whereby the end product will not be something unsatisfiable towards the end-users, reducing the risk or cost of changing the product at a later date.

#### Rapid Application Development

Rapid application development, as the name suggests, is a methodology whereby it produces a product quickly( Lucidchart , 2018 ). For the first phase, The methodology first requires the team to investigate the problem, state the requirements, and showcase the finalized version to the stakeholder to verify. The next 2 phases will be a cycle of rapid prototyping and rapid development until all the requirements are met. In those 2 phases, the stakeholders will be involved as well until the end of the phase. In the 4th and last phase, the product will be finalized.

This methodology is excellent for an experienced team of coders, developers, and engineers.

#### Waterfall Development method

Waterfall is a traditional approach, separating each phase into exact, simple steps, which is easy for moderate to low experienced project managers ( Wilfred 2017 ). This methodology follows a linear approach, starting from investigating the problem, documenting the requirements. The next phase is designing the system for different stakeholders using appropriate UML diagrams. The next phases are similar, in which they are straightforward and easy to follow, producing a clear, well-defined documentation

#### The V-model method

The v-model solves a problem from the waterfall model when used for large systems. In large complex systems, it is easy to miss some key details in the requirements phase, causing a deviation and producing a totally different product (Weilkiens, 2007). In order to reduce the significant and costly mistake, the v-model adds appropriate testing for each phase of the waterfall approach (Weilkiens, 2007). This will reduce the deviation of the end product without affecting the linearity of the phases.

### Chosen Methodology

Before going further into choosing one of the selected methodologies, some things needed to be considered that constraints the produced system.

The things that need to be considered are as follows :

* The system has a limited time constraint.
* The system will be developed with a low or moderate experienced person, requiring the phases to be quickly followed.
* The requirements of the system are defined and do not require further analysis.
* In order for the product to work, all modules need to be in place during the implementation.

Now considering the constraints for the proposed system, the chosen methodology will be waterfall development methodology, especially the iterative waterfall development.

### Justification

For the incremental developments such as agile and rapid application development strength comes from a flexible team with experience in a particular domain, producing features in an iterative matter (Sommerville, 1982). The requirements and features will always be adjusted depending on the end-users and stakeholders. Therefore the documentation will be reduced, focusing only on the product. This would cause the product not to have a document to be depended on during the maintenance phase, and other teams will have a difficult time to maintain the product (Sommerville, 1982).

Albeit incremental developments have their benefits, it will not be suitable for this proposed system.

This leads to either choosing v-model and waterfall. The v-model would be in particular beneficial since, for each phase, there will be particular tests and requires to pass those tests in order to continue(Mohammad,2019). However, with the time constraints, it would be difficult to complete the proposed system, therefore not choosing this method as well.

Despite the fact that the traditional waterfall has its problem such as the risk of having a different end product, causing the product to be called a defect, the waterfall issue could be minimized using the iterative waterfall methodology(Mohammad,2019).

Unlike the traditional waterfall model, whereby it prevents going to a previous phase to adjust or do some corrections, the iterative approach allows adjustments for previous phases when needed(Mohammad,2019). This could minimize the deviation of the end product while maintaining the simple and easy to follow phase, completing the system on time.

## Phases of the Chosen Methodology

## Technology Used Description

### UML Modeling

### User Interface Prototyping

### Backend

#### Ts.ED

#### MongoDB/Mongoose

#### GraphQL/Apollo

#### Jest

### FrontEnd

#### React

#### Typescript

#### Apollo Client

#### Tailwind CSS

### Development Operations

## System Requirement Analysis

### Hardware

### Software

## Chapter Summary

# REQUIREMENT ANALYSIS AND DESIGN

## Introduction

.

## Requirement Analysis

## Project Design

## Database Design

## Interface Design

## Test Case Design

## Chapter Summary

# CONCLUSION

## Introduction

## Achievement of Project Objectives

## Suggestions for Future Improvement

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Appendix A

Appendix B

Appendix C