



**ARTIFICIAL INTELLIGENCE INTEGRATED
E-LEARNING SYSTEM**

**UNDERGRADUATE THESIS
SUBMITTED AS ONE OF THE REQUIREMENTS TO OBTAIN
SARJANA KOMPUTER (S.KOM.)**

BY

TASYA PUTRI WULANDARI

001202200114

**FACULTY OF COMPUTER SCIENCE
INFORMATICS STUDY PROGRAM
PRESIDENT UNIVERSITY**

CIKARANG

AUGUST 2025

SIMILARITY INDEX REPORT

Capstone Design - AI Integrated E Learning System

ORIGINALITY REPORT

8%

SIMILARITY INDEX

6%

INTERNET SOURCES

3%

PUBLICATIONS

4%

STUDENT PAPERS

PRIMARY SOURCES

1

Submitted to President University

Student Paper

1%

2

Submitted to College of Estate Management

Student Paper

<1%

3

[dspace.daffodilvarsity.edu.bd:8080](https://dspace.daffodilvarsity.edu.bd/8080)

Internet Source

<1%

4

repository.president.ac.id

Internet Source

<1%

5

www.coursehero.com

Internet Source

<1%

6

Phenikaa University

Publication

<1%

7

irep.iium.edu.my

Internet Source

<1%

8

winsepang.eu.org

Internet Source

<1%

9

d197for5662m48.cloudfront.net

Internet Source

<1%

10

www.mdpi.com

Internet Source

<1%

11

Submitted to HELP UNIVERSITY

Student Paper

<1%

ABSTRACT

The English Language Learning Center's standard methods of instruction can be challenging. Students do not have much of a chance to practice when they are not in class. Tutors are outnumbered by students. This study aims to develop an AI-integrated e-learning system that utilizes a voice-based chatbot with virtual character interaction to address these limitations. The method involves combining several technologies where OpenAI handles the conversation logic, React.js builds the interface that students see, and Python with Flask manages everything behind the scenes. The avatar gives feedback on pronunciation as well as grammar. This functionality helps make learning fun as well as similar to real conversations. Students can use the system anytime. The system also has a "Track Your Journey" module to record progress. There are quizzes to help students see how much they have learned. It helps regular ways of learning when there are not enough tutors to help students one-on-one.

Keywords: Artificial Intelligence, E-Learning, Voice Chatbot, English Language Learning, Virtual Character Interaction

TABLE OF CONTENTS

ABSTRACT.....	i
DEDICATION	ii
ACKNOWLEDGMENTS	iii
TABLE OF CONTENTS.....	iv
LIST OF TABLES	vii
LIST OF FIGURES	viii
CHAPTER I.....	1
INTRODUCTION	1
1.1 Background	1
1.2 Problem Formulation	1
1.3 Problem Limitation	2
1.4 Research Objectives.....	2
1.5 Solution Selection	3
1.6 Research Methods.....	3
CHAPTER II.....	4
LITERATURE REVIEW	4
2.1 Literature Review.....	4
2.2 Development Tools	5
2.2.1 Python with Flask Framework	5
2.2.2 React.js Library	5
2.2.3 Relational Database Management System with MySQL.....	6
2.3 Comparison Table	6
CHAPTER III	8
SYSTEM ANALYSIS AND DESIGN	8
3.1 System Analysis	8
3.2 System Architecture	8
3.3 Product Function.....	9
3.3.1 Use Case Diagram.....	9
3.3.2 Use Case Scenario.....	9
3.3.3 Activity Diagram	14
3.4 Database Design.....	15

3.4.1	Entity Relationship Diagram (ERD).....	15
3.4.2	Security Risk Management.....	16
3.5	Interface Requirements	16
3.5.1	User Interface.....	16
3.5.2	Hardware Interface.....	17
3.5.3	Software Interface	17
CHAPTER IV		19
SYSTEM IMPLEMENTATION AND TESTING		19
4.1	Development Environment Setup	19
4.1.1	Backend Environment Configuration	19
4.1.2	Frontend Environment Configuration.....	19
4.2	System Implementation	20
4.2.1	Authentication System	20
4.2.2	Progress Tracking.....	29
4.3	Database Implementation.....	32
4.3.1	Create Database	32
4.3.2	Create Users Table	33
4.3.3	Create User Sessions Table	33
4.3.4	Create Password Reset Token Table	34
4.3.5	Create Agent AI Table.....	34
4.3.6	Create Quiz Attempts Table	35
4.4	User Interface Implementation	36
4.4.1	Login Page	36
4.4.2	Forgot Password Page.....	36
4.4.3	Register Page	37
4.4.4	Main Page	38
4.4.5	Progress Tracking Page.....	38
4.5	Software Functionality Testing	39
4.5.1	Requirement Analysis Testing	39
4.5.2	Functional Requirement Testing	42
4.6	User Test Result	43
4.6.1	Qualitative Testing with Questionnaire.....	44
4.6.2	Questionnaire Result.....	44
CHAPTER V		47

CONCLUSION.....	47
6.1 Conclusion	47
6.2 Suggestion.....	47
REFERENCES	48

LIST OF TABLES

Table 2.1 Comparison Table	6
Table 3.1 Add Account Use Case Scenario.....	9
Table 3.2 Edit Account Use Case Scenario.....	10
Table 3.3 Display Result Use Case Scenario	12
Table 3.4 Security Risk Management	16
Table 3.5 User Interface Requirements.....	16
Table 3.6 Software Interface Requirements.....	17
Table 4.1 Save User Progress to Database Testing	39
Table 4.2 Login System and User Progress Testing.....	40
Table 4.3 Forgot Password Testing	41
Table 4.4 Track Your Journey Testing.....	41
Table 4.5 Secure Login Authentication Testing 1	42
Table 4.6 Secure Login Authentication Testing 2	43
Table 4.7 List of Questionnaire Questions.....	44

LIST OF FIGURES

Figure 3.1 Use Case Diagram	9
Figure 3.2 Edit User Account Activity Diagram.....	14
Figure 3.3 Forgot Password Activity Diagram	14
Figure 3.4 Progress Tracking Activity Diagram	15
Figure 3.5 Entity Relationship Diagram (ERD)	15
Figure 4.1 Login Verification Code	22
Figure 4.2 User Authentication Code.....	24
Figure 4.3 Session Management Code.....	25
Figure 4.4 Password Recovery Code	28
Figure 4.5 Progress Tracking Code.....	30
Figure 4.6 Daily Summarization Code	31
Figure 4.7 Evaluation Metrics Summarization Model.....	32
Figure 4.8 Create Database ELLC System Query	32
Figure 4.9 Create Users Table Query	33
Figure 4.10 Create User Sessions Table Query.....	33
Figure 4.11 Create Password Reset Token Table Query	34
Figure 4.12 Create Agent AI Table Query	34
Figure 4.13 Create Quiz Attempts Table Query.....	35
Figure 4.14 Interface Login Page.....	36
Figure 4.15 Interface Forgot Password Page	36
Figure 4.16 Interface Register User Account.....	37
Figure 4.17 Interface Dashboard Main Page	38
Figure 4.18 Interface Progress Tracking Page	38

Figure 4.19 Result of Questionnaire Question Number 1.....	45
Figure 4.20 Result of Questionnaire Question Number 2.....	45
Figure 4.21 Result of Questionnaire Question Number 3.....	45
Figure 4.22 Result of Questionnaire Question Number 4.....	46
Figure 4.23 Result of Questionnaire Question Number 5.....	46

