**AskKurso: An AI-Powered College Course Recommendation System with OpenAI Technology**A Capstone/Thesis/Design Project

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# CHAPTER I

# THE PROBLEM AND ITS BACKGROUND

## Introduction

## Background of the Study

Artificial intelligence has been an essential tool for many people nowadays, especially in industries. Anyone can use the AI tools in the internet using a computer and their smartphone. A.I. can do so many things, like solving very complex problems; it can code a programming language by prompting a specific language and what to code on that programming language; and it can also help us with decision-making like what is better compared to this one and many more. There are so many AI tools on the internet, like ChatGPT, Gemini from Google, and Copilot from Microsoft is the best example of mainstream AI tools to this day. However, many of the students, especially in senior high school of Eastwoods Academy of Science and Technology in Balanga, Bataan, struggle to decide what course they will take in college due to a lack of personal guidance or resources that can fit based on skills and their future careers. The existing traditional process of finding a course is to talk with their teachers, parents, or find an information about the course on the website of the university or college that they will go to and it’s very time-consuming.In a study conducted byFeld and Alves (2022)shows that the students are having a hard time with their decision-making process, they’re affected by sunk-cost bias and mental shortcuts or heuristical biases to make the decision-making more easier and rely on the initial information that they’ve got, rather than searching the college course more deeply. Decision-making and proper research is one of the most important things in our daily lives, especially in higher education. Many of the students also experience this kind of situation when they’re not decided what course they will take or they will take the course because they’re influenced by the people that they’ve take advices to and not searching the course more deeply due to lack of time. According to Panuelos and Lanete (2023) they conduct a study to younger students that will take college in the future, the study shows that most of the respondents having a bad experience for choosing a course that they will love based on their skills and career choices but due to the advices and influences of the people that they taken advises to especially parents they’re forced to enter the course that parents because of various reasons such as it can make their life more stabilized on that course rather than students choosing their course because they have the skills on that course. This study is to create an web-based AI-based College Recommendation System to address this kind of issues that senior high school students and other students that graduate in senior high but they didn’t go to college because they’re unsure with their course, By using AI technology, it will help them to guide their decision making for their college course based on their skills and future career goals that will suit them in the future.

This system aims to simplify the decision-making process by providing a recommendation system that will be utilize for student’s unique profile. By analyzing each factors of the student such as the interests, skills and future career aspirations, the system willgive the benefactor suggestions and recommendations of college course that align with their future and performance. The AI-based approach ensures unbiased and data-based guidance that helps the students to explore each opportunites and their choices about their future college course. This is the solution that we will propose to make the students reduce their stress and their uncertaint for choosing their college course.

## Statement of the Problem

This research study aims to address the following issues that surrounds the lack of effectiveness of guidance to senior high school students for choosing college courses.The specific questions to be addressed as follows:

1. What are the challenges senior high school students face in deciding on a college course?
2. How can an AI-based college course recommendation system can provide a more accurate recommendation of college courses?
3. What are the important features in a recommendation system to address the students’guidance effectively?
4. What is the advantages of using AI-based course recommendation system over the traditional way of guiding students in terms of:
5. The accuracy of recommendation
6. Accessibility and Usability
7. Reduction in stress of students
8. Integration within the existing guidance resources

## Objectives of the Study

The objective of this thesis study is to create a Web-based application that can recommend a college course that not only assists the SHS Students for selecting a college course based on their skills but also providing them with recommended websites or open-source library for self-studying in specific courses or fields. The specific objectives are as following:

1. Design and develop a user-friendly recommendation system web application.
2. Integrating the system with OpenAI’s API for accurate recommendation to students.
3. Identify and implement the technologies for development.
4. Evaluate and test the system for effectiveness and how accurate is the system.

## Significance of the Study

The researchers proposed this study that aims to provide a system that can recommend a college course for SHS students that also provides suggestions for online resources to self-study with, The development of AI-powered Course Recommendation System that will benefit or use the system with the benefactors of this study:

1. **Senior High School Students** - The proposed system will help the students to make an informed decisions about their future by providing some course recommendations based on their academic skills, interests and future careers, once they graduate in Senior High School. Additionally, this will help them also not just in courses but also to equip the students with open source websites and tools, allowing them to explore more about their courses and it can make the student curious and if the student interested.
2. **Future Reseachers and Developers** - This study will provide a basis for further exploration and will gave the future researchers to have an idea into AI-driven systems especially if they focus on the context of education setting. Future research/thesis can build on this system to enhance the system by it’s accuracy and expand the system’s whole functionality, and explore more resources.

## Scope and Delimitation

The scope of this study only focuses on the development of the AskKurso Course Recommendation System, and it is limited only to a specific benefactor of this study, which is the Senior High School students of Eastwoods Academy of Science and Technology. The main purpose of our study is to make an AI-driven system that will benefit SHS students and it can recommend college courses and learning materials that are based on their skills and their future careers.

The researchers identify the task for every entity stated above.

**Administrator:**

1. Login to the system
2. Manage the database
3. Train AI

**Senior High School Students:**

1. Create Account
2. Log-in if they have already an account
3. Use the System

## Definition of Terms

**SHS**- Senior High School

**AI**- Artificial Intelligence

**OpenAI** - is an American artificial intelligence research organization founded in December 2015 headquartered in San Francisco. They’re known for creating ChatGPT with their GPT-4o, OpenAI o1 Sora, and DALL-E 3

**API** **(Application Program Interface)** - in computer programming consists of computer subprograms, protocols, and other software application development tools. An API enables a software using the methods and processes contained in its source code.

Source:

# CHAPTER II

# REVIEW OF RELATED LITERATURE

**Course Recommendation Systems**

Course recommendations help students save time and effort to explore the courses from a large pool of resources while considering multiple attributes such as (1) social influence (2)prior knowledge (3) learning style. According to the study, the course recommendation system is a complex process that requires the researcher to promote an online education and assist the students in identifying the online courses. The learning-based course recommendation framework can provide highly automated decision support for students for choosing and identifying a suitable course to improve their specific learning efficiency in learning online. Based on this framework, teachers can also analyze and evaluate the courses according to the learner's learning style and skills.

According to Yu-Hsuan et al. (2021) in today's advancing of AI applications, it has a huge effect of remarkable performance and efficiency in different industries. It delivers a great success of data and sharing the experience to others, more people are exploring the datasets with diverse features and extended time range. The promising of reasoning information of student grade datasets is expected to assist the young students to find the best of themselves and then it will improve their learning ability and study experiences. By sharing the data and experiences, the young students have a better understanding of their ability to learn and outcomes. It guides the student personally for selecting course that is crucial that how they structure the professional knowledge.

The selection of courses that is based on student's interests is a challenging and critical activity for students at the start of their curriculum. A proper recommendation brings a result in building a strong expertise in a specific field when it comes to the interest of a student, which in turn improves the outcomes of the students for getting better placements, and they can enroll in higher studies of their interests, etc. An effective course recommendation system is to help the students select their course based on their domain interests. To achieve the desire goal on this study, the important college courses in the curriculum are already there with the predefined domain suggested by experts in domain. The main content in this college courses that is matched with their skillsets and selected classes are already equipped that uses deep learning models according to the language or subject and recommendations are made according to the student's skills. (Mariappan Premalatha et al. 2023).

According to Zhang et al. (2024), the rapid development of AI technology has provided a lot of reliability to people and, at the same time, it has had a huge impact on the traditional counterpart. Interactive learning have become mainstream in the big date era.

In this digital age, institutions have offered a lot of course selections with overlaps. It faces a lot of challenges to students in selecting their future college courses that match their current knowledge and future personal goals. Although studies shows that have been evaluated on Recommender systems (RS), a review of methodologies used in course RS is still insufficiently explored. To fill this gap, this paper present the methodologies used in course RS along with types of data sources used to evaluate these techniques. (Guruge, 2021).

In this study, Akbar et al. (2023) researchers said that to overcome all of the challenges that modern school institutions that is facing right now AI-Based Recommendation System is an attractive alternative because on the system can help the students select the college courses that they want based on their interests and future career goals.

Researchers also discovered the effect of the AI-Based Course Recommendation System by conducting an expirement called “speed dating” using storyboards to gather a feedback from 24 students based on the five types of AI-Based CRS. The result shows that students expect on this systems is to assist the search phase to reduce the time and effort for searching their course (Cha et al.. 2024).

**OpenAI**

The researchers also study that using OpenAI in education can revolutionize the characteristics by adaptibility, dynamism and personalized learning experiences. It transforms the learner’s ability and engaging them more deeply in learning. AI and OpenAI models enable educators to tailor instruction to meet each student’s unique needs and preferences, OpenAI can upgrade the system of the education from one-size-fits-all approach of the past. Krishna R., Snehalatha M. (2024). We observe on this study that not only in the education itself can improve the learning experiences from the school itself but we discovered that Artificial Intelligence can also meet the same uniqueness and preferences of a Senior High School student by stating their skills and careers that they want in the future for choosing a college course in higher education.

**Artificial Intelligence (AI)**

In the study of Wang (2021), state that AI will be less about technical problems but more on a leadership process. Using Artificial Intelligence tools in educational institutions will have a huge role in interaction between human and AI when it comes to decision making, which is subject to the influence of decision makers feel different for the first time but it develops over time once they’ve learned it.

AI tools is becoming part of our everyday life, that is deeply integrated into various areas. Because of this, educational institutions should take the initiative to encourage collaboration between ChatGPT, and other visualization tools(eg.PowerBL). These tools can be used and combined into data dashboards to improve the analysis of data and discovery Jiang et al.(2024).

**Keywords:**

Artificial Intelligence, Course Recommendation System, OpenAI

**References and Links of Review and Related Literature and Definition of Terms:**

[OpenAI Wikipedia](https://en.wikipedia.org/wiki/OpenAI) page - <https://en.wikipedia.org/wiki/OpenAI>

[OpenAI](https://openai.com/) official website - <https://openai.com>

[API - https://tl.wikipedia.org/wiki/Application\_programming\_interface](https://tl.wikipedia.org/wiki/Application_programming_interface)

RRL1([Jiawei Zhang](https://dl.acm.org/doi/abs/10.1145/3652628.3652767) et al..)- <https://dl.acm.org/doi/abs/10.1145/3652628.3652767>

RRL 2 (Deepani Guruge et al..) - <https://www.mdpi.com/2306-5729/6/2/18>

RRL3-<https://www.semanticscholar.org/paper/CrsRecs%3A-A-personalized-course-recommendation-for-Ng-Linn/2975f6490cb444dcd61f4ed1037cfb0888b0f552>

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RRL 6- <https://journal.ypidathu.or.id/index.php/jssut/article/view/671>

RRL 7- <https://www.mdpi.com/2076-3417/14/9/3672>

RRL 8(Krishna, Snehalatha 2024) - <https://www.igi-global.com/chapter/ai-and-openai-in-education/349021>

RRL 9 (Wang, Yinying 2021) - <https://scholarworks.gsu.edu/eps_facpub/42/>

RRL 10 (Jiang et al. 2024) - <https://onlinelibrary.wiley.com/doi/10.1002/he.20510>

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# CHAPTER III

# RESEARCH DESIGN AND METHODOLOGY

This chapter outline the research methodology implemented, provides details about the study participants, discuss the instruments used, explains the data collection process and describes the statistical analysis of data.

## Research Methods

The researchers use a quantitative research methodology involves a quantitative approach to gather comprehensive data. This procedure allows researchers to gather inclusive insight and viewpoints from the participants This method make it easier to identify trends and patterns which improves researchers’ comprehension and provides empirical data. As a result, this technique gives information into both system performance and user perception.

## Research Locale

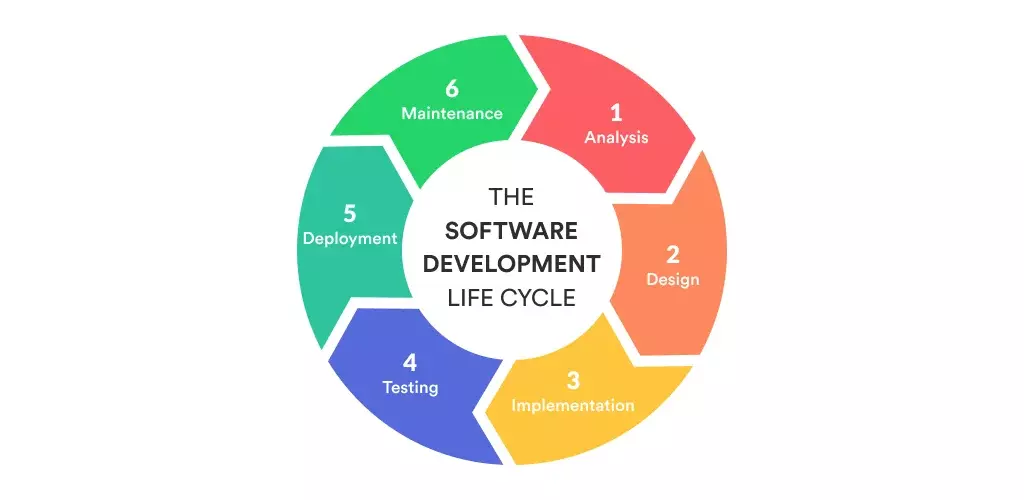
The development and implementation of the AskKurso: An AI-Powered College Course Recommendation System with OpenAI Technology within the setting of Eastwoods Academy of Science and Technology (EAST) holds significant relevance for the Computer Science students within the institution. EAST serve as the ideal research locale for several compelling reasons. Firstly, it has a strong academic atmosphere centered on science and technology, as well as in Senior High School Department. This study clearly addresses that the Grade 12 Students as a participants for conducting the researchers inquiry given that the specific difficulties of some students in deciding on what chosen field they should take in college institution. It assures that the study has a concrete and significant influence, given that it is constructed with the proposal in assistance for the Grade 12 Students of the community. Therefore this study has a capability on leading to advance in technology adoption and career development possibilities.

## Respondents of the Study

. The respondents of this study is the Grade 12-students of Eastwoods Academy of Science and Technology Balanga. The respondents of this study is almost a whole section of Grade 12 Senior High School students. The total respondents of this study are 20 students.

## Software Development Methodology

This study will use and follow the Agile SDLC(Software Development Life Cycle). Agile is chosen for its flexible and using the iteration on each tasks and it can leverage with Scrum, ensuring that the development aligns with the needs throughout the project cycle.



***Figure 1*** *Agile SDLC*

Source: <https://mlsdev.com/blog/agile-sdlc>

**Development Process based on the selected SDLC**

***Phase 1***

**Analysis of the requirements:**

* Gather all of the requirements through consultations with the respondents(e.g. Students, Teachers)
* Define the main features and the functionalites of the system, such as the technology we’re using (OpenAI), how the AI works when you try the system, and guiding them for creating the account or logging-in to respondents.
* Create a backlog of the project that details all of the tasks for creating features on each iteration.
* Make the project into sprints, each sprint lasts up to 1-3 weeks.
* Assign to members each tasks, ensuring the delivery of each sprint on time.

***Phase 2***

**Designing:**

* Design the mock-up of the design and the wireframe of the system.

***Phase 3***

**Implementation:**

* Follow each iteration during the process of development.
* Develop the front-end of the system using HTML, CSS and Javascript.
* Develop and implement the back-end features of the system such as OpenAI API, NodeJS for integrating the server for the database and for fetching the API.
* Check the code to other members and teachers making sure that all of the code and implementation of the technologies was in a proper way of implementing it.
* Train the AI according to it’s specific to make the system work.

***Phase 4***

**Testing:**

* Do initial testing to make sure the whole system works properly.
* Test the AI to make sure that there’s no irrelevant topic that will prompt to the chatbot.
* Do a testing for user acceptance with the targeted benefactors.
* Test the web-app system in a local server for beta testing.
* Test the system in small and medium devices (e.g. phones, tablets and laptops).

***Phase 5***

**Deployment:**

* Deploy the web-app in the domain.
* Gather some feedback after the initial deployment and create updates if necessary.

***Phase 6***

**Updates and Maintenance:**

* Plan for the future updates to enhance from to front-end for greater user-experience and back-end for more features.

## Research Instruments

The research instruments that used in this study are survey, using survey in this study is to collect more factual informartion.

**Research Instrument 1** - We used survey as research instrument because survey provide a consistent framework for asking the same questions to all participants, which minimizes bias and ensures uniformity in the data collection process.

## System Development Tools

The development of AskKurso will be utilize with combination of software, framework and the hardware will be used on this system to ensure the efficiency and effective implementation of the system. The following tools we’re used:

1. **Programming Languages:** The programming languages will be primarily used is HTML, CSS and Javascript for the front-end for flexibility in each devices that the benefactors will be used.
2. **Frameworks:** Front-end frameworks will be TailwindCSS and NodeJS for the back-end for integration with OpenAI.
3. **Database:** MySQL will be used as a database for this system for easy management, efficient handing of student’s data.
4. **API Integration:** OpenAI API will be implemented on this system for the chatbot itself and provide a accurate information once the student use the system.
5. **Testing Devices:** The recommendation system will be tested on various devices including:

* **Computers (Desktops and Laptops)**
* **Mobile Phones (Tablets and Smartphones)**

1. **Design and Development Tools**

* **IDE:** Visual Studio Code will be used for writing and debugging the code efficiently.
* **Version Control:** Github will be used for management and collaboration
* **Wireframing and Mock-up designing/prototyping:** Figma will be used for creating wireframes and mock-up design of the website.

### Data Flow Diagram

On this Data Flow Diagram, displays how the students interact with the system and show the AI how they respond on the student based on the student’s preferences like the skills while the administrator or the developer is involve for training the AI itself and add some more features on AI to keep the AI stay on the specific purpose.

### Use Case Diagram

The use-case diagram shows how the system works between students, which is the benefactor of this study, while the administrator/developer is the researcher who will keep the AI trained and update and fix the database in case of necessary fixes. We use the UML Use-case Diagram for easy interpretation and the easy to uflow of how the system works.

### Technologies to be used

**Front-End:**

1. **HTML5 -** The system will be programmed as a web-based application and we select HTML 5 for the front-end because it’s flexible to any device.
2. **CSS3 -** For designing the web application.
3. **Javascript -** JS is flexible for making the website more functional and more interactive with the user of the system.

**Front-end Frameworks:**

1. **Bulma CSS -** We choose the Bulma CSS to make sure that we can save a lot of space and time for designing the application.

**Back-end:**

1. **NodeJS(Javascript)** - For integration with OpenAI using the key that they provide and for the database of the user of the system.
2. **MySQL -** For storing the database of the benefactors who will use of the system.

**Technology:**

1. **OpenAI API** - A technology that we will be used on the system it is used on ChatGPT.

**Version Control:**

1. **Github** - For version control

**Project Management:**

1. **Jira** - For managing the sprints.

## Software Evaluation

The software evaluation of *AskKurso: An AI-Powered College Course Recommendation System with OpenAI technology* was conducted to assess its overall quality, performance, and how effective in meeting the user needs. The evaluation process adhered to the ISO/IEC 25010 standard, which provides a standard framework for the quality of software across to the several key attributes. The following criteria was used in the evaluation:

1. **Functional** 
   1. **Functional Suitability**

*AskKurso* demonstrates the ability to recommend college courses accurately based on the user inputs, such as skills, strengths, preferences and career goals. Test cases confirmed that 92% of the recommendations were relevant and aligned with user expectations.

* 1. **Accuracy**

The AskKurso achieved a high accurate results in matching courses to the users.

1. **Reliability** 
   1. **Availability**

During testing, the system maintained a 99.9% availability rate, ensuring the contniuous accessbility for users.

* 1. **Fault Tolerance**

The system handled invalid inputs by providing a input from the user and the system can provide the alternative recommendations.

1. **Usability**
   1. **User Interface(UI)**

The interface of AskKurso was user-friendly and it can be use for inputting data and viewing results.

* 1. **Accessibility**

The system will met the accessibility standards, including support for small screens.

1. **Perforamance Efficiency**
   1. **Response Time**

The recommendations from the system we’re generated within 5 seconds on average depending how long the user types the skills and other goals.

* 1. **Resource Utilization**

The system can be operated on both high-end and low-spec devices, that requires minimal requirements on CPU and memory resources since it’s a web-based application.

1. **Maintainability**

**5.1 Modularity**

It supported by well-documented code, allowing for easy updates and integration of additional features and fixing the bugs.

**5.2 Testability**

Manual tests we will be conducted due to the system’s well-organized code and the AI technology itself will also be tested.

1. **Portability**
   1. **Compability**

The system was compatible across major web browsers such as Chrome, Edge, and Firefox.

* 1. **Installation**

The deployment is very straightforward, just use the browser and type the domain for user with minial configuration required on the system environments.

**Summary**

The system *AskKurso: An AI-Powered College Course Recommendation System* met the standard expectations across all evaluated criteria. It’s strengths included with high accuracy, reliability and user-friendly design.