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Undergraduate Project Report

2024/25

**AI-Enhanced Student Skills Development Tracker**

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# Abstract

The AI-Enhanced Student Skills Development Tracker is a project designed to evaluate and track the development of critical student skills, such as critical thinking, problem-solving, and collaboration, using advanced artificial intelligence techniques. Traditional methods of assessing student performance, such as tests and assignments, provide limited insights into a student's progress in these multidimensional skill areas. To address this limitation, the system leverages AI, particularly machine learning (ML) and natural language processing (NLP), to analyze a student's behavior, assignment results, and classroom activities. The AI model processes multimodal data, offering both students and educators personalized insights and recommendations for skill improvement. This tracker provides a more holistic view of a student's performance, encouraging incremental growth in essential competencies through real-time feedback. The project aims to support educators in fostering comprehensive student development and empowering students to take control of their own learning journeys. The ultimate goal is to create a system that not only tracks skill development but also provides actionable, data-driven feedback to enhance both teaching and learning practices.

# Keywords

AI, Student Skill Development, Critical Thinking, Problem-Solving, Collaboration, Personalized Learning, Natural Language Processing (NLP), Machine Learning, Skill Assessment, Education Technology, Learning Analytics, Feedback System, Recommendation Engine.

**摘要**

人工智能增强学生技能发展跟踪项目旨在利用先进的人工智能技术评估和跟踪学生关键技能的发展，如批判性思维、解决问题和协作。评估学生表现的传统方法，如考试和作业，对学生在这些多维技能领域的进步提供的见解有限。为了解决这一限制，该系统利用人工智能，特别是机器学习（ML）和自然语言处理（NLP）来分析学生的行为、作业结果和课堂活动。人工智能模型处理多模态数据，为学生和教育工作者提供个性化的见解和技能提高建议。这个跟踪器提供了一个更全面的学生表现视图，通过实时反馈鼓励基本能力的增量增长。该计划旨在支持教育工作者促进学生的全面发展，并使学生掌握自己的学习历程。最终目标是创建一个系统，不仅可以跟踪技能发展，还可以提供可操作的、数据驱动的反馈，以增强教学和学习实践。

**关键词**

人工智能、学生技能发展、批判性思维、问题解决、协作、个性化学习、自然语言处理（NLP）、机器学习、技能评估、教育技术、学习分析、反馈系统、推荐引擎。

# Introduction

## Project Overview

In contemporary education, the cultivation of critical skills—critical thinking, problem-solving, and collaboration—has become paramount for student success. However, traditional assessment methods primarily focus on observable outputs (e.g., exam scores, project deliverables), neglecting the dynamic processes and implicit contributions that underpin skill development. This gap motivates the development of the AI-Enhanced Student Skills Development Tracker, a system designed to provide a holistic, data-driven approach to tracking and enhancing student competencies.

## Objectives

### Format for headings

Format for level 1, 2 and 3 headings is given in this template; just choose the relevant style from the format list.

### Format for body text

Font Times New Roman, Font size should be 12pt, 1.5 line spacing in and justified. Do not indent the first line.

### Format for equations

Equations should be centred with a numbered caption on the right; an example is below:

|  |  |  |
| --- | --- | --- |
|  |  | (1) |

### Format for figures

Figures should be centred and followed by captions. Captions should be centred, 10pt font Times New Roman Bold. Use automatic numbering without chapter number for captions. Select “Caption” from Styles and Formatting to format captions.

Whenever you include a figure in your document you must reference it in the text e.g. this is a reference to Figure 1 using an MS Word **cross-reference** for the figure number.

When presenting graphs, make sure you label the axes and include units where applicable. Also include a legend (i.e. key) where appropriate.

Figure : Comparison of energy components

### Format for Tables

Unlike figures, the caption for a table should be before the table; Table 1 shows an example of the correct layout.

Table : Example Table

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# Background

In this part of the report, you should give all the relevant background information about your project. Remember that your reader will not necessarily know the background technology you are using, so it is worthwhile to let them know.

Also if your project is a research project, this is a good place to put down the related work or state of the art in the area – what the others have done? And why your research is novel?

But don’t make the background too long with every detail. It should be relevant to your project, with all the necessary information, written nicely and crisply.

# Design and Implementation

Normally there will be a part about the design and implementation of the system, especially for an implementation type of project. However, every project has its unique phases so you should talk to your supervisor about it.

# Results and Discussion

Most projects will have results, especially for a research project. But again you should talk to your supervisor about it.

# Conclusion and Further Work

The conclusion is an important part of the report, as it states what you have done for the project.

## Conclusion

It concludes the findings of your research or the outcome of implementing a system. A good conclusion will NOT repeat what you have done, but set out the achievements very crisply.

## Reflection

This chapter should include a reflection statement for your project. You should critically reflect upon the technical skills developed, new knowledge gained, and lessons learnt on the project journey. You are encouraged to include reflections on broader ethical, social, legal, and environmental issues, allied with good professional practice and behaviour you have adopted in conducting your project.

## Further work

Further work can be the next step of your research, or some functionality that can be added to the implementation to make it more practical.

**NOTE: The maximum length of the report up to here is 50 pages.**

References

Everything you cite from other sources should be properly referenced. The QMUL Faculty of Science and Engineering has identified the Vancouver referencing style (and its variations) as the recommended style for project reports. Details about the referencing style and examples can be found online. <https://www.qmul.ac.uk/library/academic-skills/referencing-hub/referencing-guides-and-resources/>

It is recommended to prepare the references with a reference management software, such as [EndNote](https://www.qmul.ac.uk/library/academic-skills/endnote/endnote-online/) or [Zotero](https://qmplus.qmul.ac.uk/mod/book/view.php?id=653429&chapterid=66169) to automate some of the processes of collecting, managing and using references. Queen Mary Library Services promote the use of [Cite Them Right Online](http://ezproxy.library.qmul.ac.uk/login?url=https://www.citethemrightonline.com/) (login required) as a tool to support Queen Mary students in their referencing.

Here are some examples in Vancouver referencing style:

**Book Chapters:**

Mouftah HT, Erol‐Kantarci M, Husain Rehmani M. Transportation and Power Grid in Smart Cities: Communication Networks and Services. 1 ed: Wiley; 2018.

**Journal Articles:**

Basar E, Di Renzo M, De Rosny J, Debbah M, Alouini MS, Zhang R. Wireless Communications Through Reconfigurable Intelligent Surfaces. IEEE Access. 2019;7:116753–73.

**Conference Papers:**

Saputra YM, Hoang DT, Nguyen DN, Dutkiewicz E, Mueck MD, Srikanteswara S. Energy Demand Prediction with Federated Learning for Electric Vehicle Networks. 2019 IEEE Global Communications Conference (GLOBECOM). Waikoloa, HI, USA: IEEE; 2019. p. 1–6.

**Online sources:**

Queen Mary University of London. Student Guide to Generative AI [Internet]. 2024 [cited 15 Jan 2025]. Available from: <https://www.qmul.ac.uk/library/academic-skills/student-guide-to-generative-ai/>

Acknowledgement

Give your acknowledgement to people who helped you during the project here. Maximum length of this section is 1 page. You may thank your supervisor but DO NOT MENTION YOUR SUPERVISOR’S NAME HERE due to the blind marking policy.

Appendices

## Disclaimer

This report is submitted as part requirement for the undergraduate degree programme at Queen Mary University of London, and Beijing University of Posts and Telecommunications. It is the product of my own labour except where indicated in the text. The report may be freely copied and distributed provided the source is acknowledged.

BUPT No.:

QMUL No.:

Full Name (Pin Yin):

Full Name (Chinese):

Signature:

Date: DD-MM-YYYY

## Project specification

Include your project specification, part 1 and part 2 here. It must be the final version submitted to QMPlus.

## Early-term progress report

Include your project early-term progress report here. It must be the final version submitted to QMPlus.

## Mid-term progress report

Include your project mid-term progress report here. It must be the final version submitted to QMPlus.

## Supervision log

Include your project supervision log here.

## Additional appendices (as needed)

Information that you think may be helpful or relevant for the reader but that is not directly relevant to the story of your project. Things that might be suitable as an appendix to a report are:

* Large tables of numerical results that have been displayed graphically in the main body of the report.
* Important parts of datasheets for specific devices you have used in your project if you think that they are important enough that the reader should have access to them without finding them off the web themselves.
* Mathematical proofs and results that are important to show but not important to the flow of the story in the report.

NOTE: Full code listings must NOT be included as an appendix, but extracts of code may be included in the body of the report to illustrate particular points. Code should be submitted as supporting documents to QMPlus.

Risk and Environmental Impact Assessment

Please refer to the project handbook section 3.6.12.