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INTRODUCTION

This report presents a project proposal for the development of an AI-powered tool for personalised learning in higher education. As identified in the first assessment, artificial intelligence is one of the key technologies transforming society as part of the Fourth Industrial Revolution [1]. The growing availability of AI technologies presents a significant opportunity to address longstanding challenges in education, particularly the inability of traditional teaching methods to adapt to individual student needs [2]. This report covers four key areas: project management and planning, including a Gantt chart and development methodology; project design, including system requirements and wireframes; enterprise and innovation considerations, exploring how the tool could be developed and deployed within a large organisation; and a personal reflection on the skills developed and the potential impact of the project on society.

TASK 1

Q1. Project Management & Planning

PROJECT SCOPE:

The scope of this project is to design and develop an AI-powered personalised learning tool for use in higher education. The proposed solution will analyse individual student learning patterns, performance data and preferences in order to dynamically adapt educational content to each student's needs [3]. The tool will be delivered as a web-based application accessible via desktop and mobile browsers, integrating with existing university learning management systems (LMS) such as Moodle. The primary target users are undergraduate students and academic staff at higher education institutions.

PROPOSED SOLUTION:

The proposed solution is an adaptive learning platform powered by machine learning algorithms. The system will:

- Track student interactions and performance in real time
- Identify knowledge gaps and recommend personalised content
- Provide automated feedback on assignments and quizzes
- Generate progress reports for both students and educators [4]

REQUIRED TECHNOLOGIES AND RESOURCES:

Development Technologies:

- Frontend: React.js for user interface
- Backend: Python with Flask framework
- Machine Learning: TensorFlow / Scikit-learn for adaptive algorithms
- Database: PostgreSQL for student data storage
- API Integration: Moodle REST API for LMS connectivity

Resources Required:

- 1 x Full-stack developer
- 1 x Machine learning engineer
- 1 x UX/UI designer
- Cloud hosting (AWS or Azure)
- University LMS access for testing (Luckin et al., 2016) [3]

PROJECT TIMELINE AND CONSTRAINTS:

Estimated project duration: 6 months

- Phase 1 (Month 1): Research & Planning
- Phase 2 (Month 2): System Design
- Phase 3 (Month 3-4): Development
- Phase 4 (Month 5): Testing & Evaluation
- Phase 5 (Month 6): Deployment & Review

CONSTRAINTS:

- Limited budget for cloud hosting
- Access to student data requires ethical approval
- Integration with existing LMS may present technical challenges
- Small development team limits parallel workstreams [1]



AI TOOL FOR PERSONALISED LEARNING – PROJECT GANTT CHART

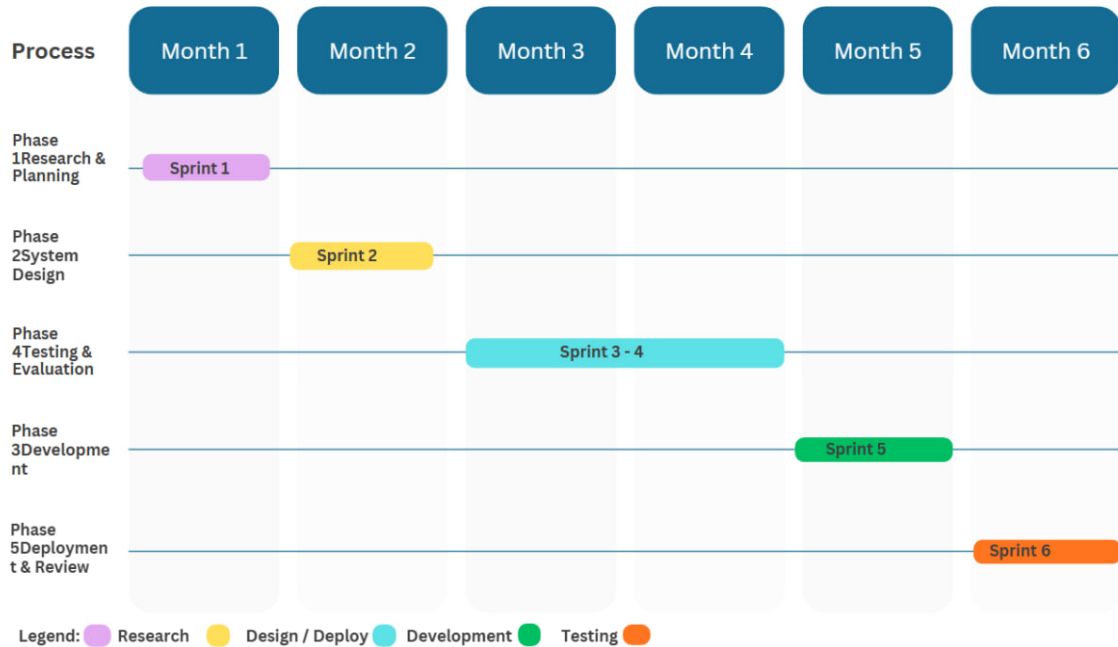


Figure 1 gantt chart

DEVELOPMENT METHODOLOGY:

This project will adopt the Agile development methodology. Agile is an iterative approach to software development that breaks the project into short cycles called sprints, typically lasting 2 weeks [5]

Agile is appropriate for this project because:

- Requirements may evolve as user feedback is gathered
- Regular testing ensures the AI algorithms are performing correctly
- Iterative releases allow educators to trial features early
- The methodology supports collaboration between developers, designers and end users

Each sprint will include planning, development, testing and a review session with stakeholders to ensure the product meets user needs [5]

Q2. Project Design

DESIGN PIECE 1 - Requirements Specification:

FUNCTIONAL REQUIREMENTS:

FR1: The system shall allow students to create and log into personal accounts securely

FR2: The system shall track student quiz and assignment performance in real time

FR3: The AI engine shall analyse performance data and recommend personalised learning resources

FR4: The system shall provide automated feedback on student submissions within 24 hours

FR5: Educators shall be able to view class and individual student progress dashboards

NON-FUNCTIONAL REQUIREMENTS:

NFR1: The system shall load pages within 3 seconds under normal network conditions

NFR2: The system shall be accessible on desktop and mobile browsers

NFR3: All student data shall be encrypted and stored securely in compliance with GDPR

NFR4: The system shall support up to 500 concurrent users without performance degradation [4]

DESIGN PIECE 2 - User Flow Diagram:

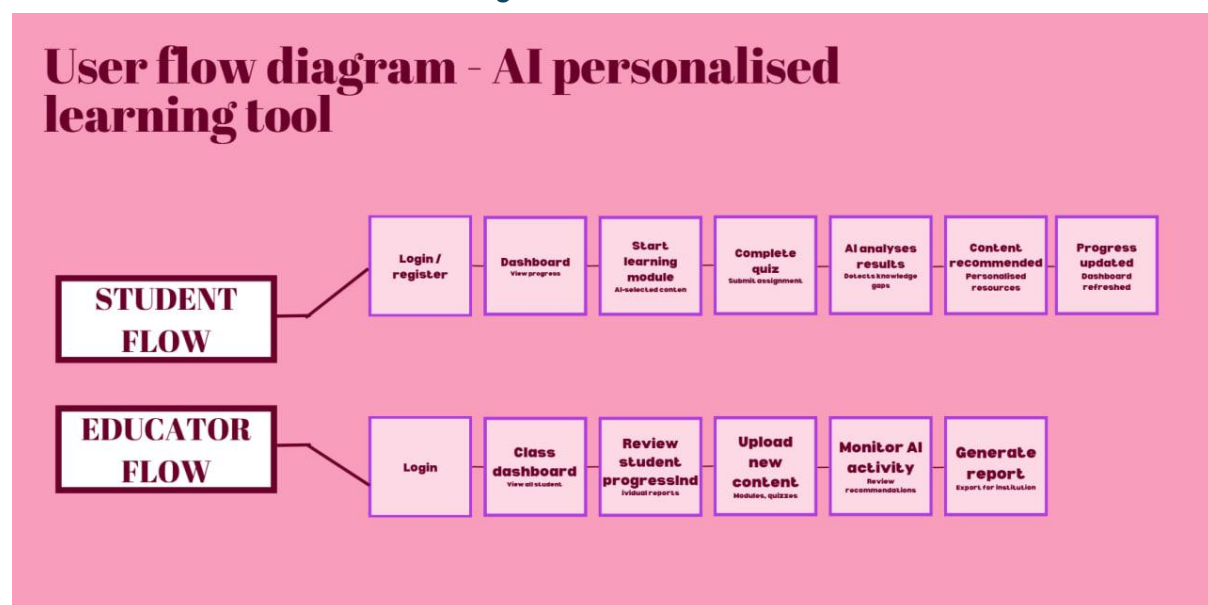


Figure 2 flow diagram

TASK 2

Q1. PEST & SWOT Analysis

Google (Google for Education / Google Classroom)

PEST Analysis: Google LLC

POLITICAL FACTORS:

- Government regulations on AI and data privacy are increasing globally, particularly in the UK and EU [6]
- UK government actively promotes EdTech adoption in higher education through funding initiatives
- Political pressure to ensure AI tools are transparent and unbiased in educational settings

ECONOMIC FACTORS:

- Global EdTech market valued at \$254 billion in 2021, projected to reach \$605 billion by 2027 [7]
- Economic uncertainty post-Covid increased demand for online and hybrid learning solutions
- High development costs for AI systems require significant investment and funding

SOCIAL FACTORS:

- Growing student expectation for personalised and flexible learning experiences [4]
- Increased awareness of mental health in education drives demand for supportive learning tools
- Digital divide remains a concern - not all students have equal access to technology and internet

TECHNOLOGICAL FACTORS:

- Rapid advances in machine learning and natural language processing enable more sophisticated AI learning tools [3]
- Cloud computing reduces the cost of deploying large-scale AI systems
- Increasing integration of AI into existing LMS platforms like Moodle and Blackboard

SWOT Analysis: Google LLC

STRENGTHS:

- Market leader in EdTech with Google Classroom used by over 170 million users worldwide

- Significant financial resources for AI research and development
- Strong existing infrastructure (Google Cloud, Gmail, Drive)
- Brand trust among educators and students globally

WEAKNESSES:

- Concerns about student data privacy and Google's data collection practices
- Over-reliance on internet connectivity limits accessibility
- Complexity of AI systems may create barriers for less tech-savvy educators

OPPORTUNITIES:

- Growing global demand for personalised learning solutions
- Government investment in EdTech in UK and globally
- Expansion into developing markets where education infrastructure is limited

THREATS:

- Increasing EU and UK data protection regulations (GDPR) may restrict data usage [6]
- Strong competition from Microsoft (Teams for Education) and emerging EdTech startups
- Ethical concerns about AI bias in educational assessment

LEGAL CONSIDERATIONS:

- GDPR (2018) requires that all student data is collected with informed consent, stored securely and not shared with third parties without permission [6]
- The UK Online Safety Act introduces additional responsibilities for platforms used by young people
- Intellectual property rights must be considered when AI systems generate educational content

ETHICAL CONSIDERATIONS:

- AI algorithms must be transparent and explainable to students and educators to maintain trust
- Risk of algorithmic bias - AI systems trained on biased data may disadvantage certain student groups [4]
- Over-reliance on AI recommendations could reduce critical thinking and independent learning skills
- Student wellbeing must be prioritised - AI systems should support rather than replace human interaction in education

Q2. Innovation - Development, Deployment and Maintenance

If the AI Tool for Personalised Learning were to be implemented within a large organisation such as a university or EdTech company, the following concepts, methods, practices and tools would be used across the full software lifecycle [5]

DEVELOPMENT:

The tool would be developed using an Agile methodology, specifically the Scrum framework. Work would be organised into two-week sprints with daily stand-up meetings to monitor progress. A product backlog would be maintained to prioritise features based on user needs and stakeholder feedback. Version control would be managed using Git and GitHub, allowing multiple developers to collaborate without overwriting each other's work. Code reviews would be conducted before each merge to maintain quality [5]

The technology stack would include:

- Frontend: React.js
- Backend: Python with Flask
- AI/ML: TensorFlow for adaptive learning algorithms
- Database: PostgreSQL
- Cloud: AWS for scalable hosting

DEPLOYMENT:

The tool would be deployed using a DevOps approach, combining development and operations into a continuous pipeline. CI/CD (Continuous Integration and Continuous Deployment) tools such as Jenkins or GitHub Actions would automate testing and deployment, ensuring new features are released quickly and reliably [8]

The application would be containerised using Docker, allowing it to run consistently across different environments. Kubernetes would be used to manage and scale containers automatically based on user demand. Initial deployment would follow a staged rollout strategy:

- Alpha: internal testing with development team
- Beta: pilot with a small group of students and educators
- Full release: university-wide deployment after feedback is incorporated

MAINTENANCE:

Once deployed, the system would be maintained through regular monitoring using tools such as AWS CloudWatch to track performance, errors and usage patterns. Automated alerts would notify the team of any system issues in real time. The AI model would require continuous retraining as new student data becomes available, ensuring recommendations remain accurate and relevant. Model performance would be evaluated regularly using metrics such as accuracy, precision and recall [3]. Security updates and patches would be applied on a scheduled basis, and annual penetration testing would be conducted to identify vulnerabilities in the system.

EVOLUTION:

The tool would evolve based on ongoing user feedback collected through in-app surveys and usage analytics. A product roadmap would guide long-term development, with planned features including:

- Natural language processing for automated essay feedback
- Integration with additional LMS platforms
- Mobile application development
- Multilingual support for international students

Regular stakeholder reviews would ensure the tool continues to meet the needs of students, educators and the institution as technology and pedagogy evolve [4]

TASK 3

DEVELOPING NEW SKILLS:

This project has provided a significant opportunity to develop both technical and transferable skills. From a technical perspective, working on an AI-powered learning tool has deepened my understanding of machine learning concepts, particularly how algorithms can be trained to analyse patterns in data and make personalised recommendations [5]. Through the project management element of this report, I have developed practical skills in planning and scheduling using tools such as Gantt charts and Agile methodologies. These are highly sought after skills in the computing industry, as the ability to plan and deliver projects on time is essential for any software development role [5]. The research process has also strengthened my academic skills, including the ability to search academic databases effectively, evaluate sources critically and construct evidence-based arguments. As identified by Booth et al, systematic research skills are fundamental to producing high quality academic and professional work [9]. Furthermore, this project has developed my understanding of enterprise and innovation concepts, including how technology products are brought to market, how organisations manage risk through frameworks such as PEST and SWOT analysis, and how legal and ethical considerations shape technology development [6]. Going forward, I intend to build on these skills by undertaking online courses in machine learning and Python programming, and by applying Agile project management principles in future university assignments and personal projects.

POSITIVE IMPACT ON SOCIETY:

The AI Tool for Personalised Learning has significant potential to create positive social impact. As argued by Robinson, traditional education systems often fail to accommodate individual learning differences, leaving many students disengaged and underperforming [7]. An AI-powered adaptive learning tool could address this by tailoring educational content to each student's unique needs, pace and learning style. Research suggests that personalised learning approaches can significantly improve student engagement and academic outcomes, particularly for students who struggle in traditional classroom environments [4]. By making high quality personalised education more accessible, the tool could help reduce educational inequality and improve social mobility. Furthermore, as noted by Schwab, the Fourth Industrial Revolution is transforming the skills required in the workplace [9]. By helping students develop digital literacy and computational thinking skills through an engaging AI-powered platform, this project could better prepare graduates for careers in an increasingly technology-driven economy. The tool also has potential applications beyond higher education, including professional development and

lifelong learning, which could benefit society more broadly by supporting continuous skill development throughout people's working lives. RISKS

AND CHALLENGES:

Despite its potential, this project faces several significant risks and challenges that must be carefully managed.

RISK 1: Data Privacy and GDPR Compliance The collection and processing of student performance data raises significant privacy concerns. A breach of student data could damage trust and result in legal penalties under GDPR [6].

MITIGATION:

All data will be anonymised before processing, stored securely using encryption, and collected only with informed consent. A data protection impact assessment (DPIA) will be conducted before the system is deployed.

RISK 2: Algorithmic Bias AI systems trained on biased datasets may produce recommendations that disadvantage certain student groups, for example students from particular ethnic or socioeconomic backgrounds [4].

MITIGATION:

Training data will be carefully audited for bias before use, and the AI model will be regularly evaluated to identify and correct any discriminatory patterns.

RISK 3: Low User Adoption Students and educators may be resistant to adopting a new AI-powered tool, particularly if they distrust AI or find the system difficult to use.

MITIGATION:

The tool will be designed with a simple, intuitive interface following UX best practices. A pilot programme will be conducted with a small group of users before full deployment, and training sessions will be provided for educators [3].

RISK 4: Technical Failures As a complex AI system, the tool may experience technical failures or performance issues, particularly under heavy usage.

MITIGATION:

Robust testing will be conducted at every stage of development, and cloud infrastructure will be configured to scale automatically to handle increased demand [5].

CONCLUSION

This report has presented a comprehensive project proposal for an AI-powered personalised learning tool for higher education. The project management section demonstrated that the tool can be delivered within a six month timeframe using Agile methodology, with clearly defined technologies, resources and design specifications. The innovation analysis highlighted that while the EdTech market presents significant opportunities, careful attention must be paid to legal and ethical considerations, particularly around data privacy and algorithmic bias. The DevOps deployment strategy ensures the tool can be maintained and evolved to meet changing user needs over time. The reflection demonstrated that this project has provided valuable opportunities to develop both technical and professional skills that are highly relevant to a career in Applied Computing. Most importantly, the tool has genuine potential to make a positive contribution to society by making personalised, high quality education more accessible to all students.

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