6COSC023W

Computer Science Final Project

Project Proposal and Requirements Specification (PPRS)

Handout

BrainWave E-Learning platform

Student: Pakapon Pakdesupaphol (W1909755)

Supervisor: Nagandiram Sadeseevam

Degree: Software Engineering

School of Computer Science & Engineering

College of Design, Creative and Digital Industries

University of Westminster

Date 25/10/2024

Declaration

This document has been prepared based on my work. Where other published and unpublished source materials have been used, these have been acknowledged in references.

Student Name: Pakapon Pakdesupaphol

Date of Submission:14/011/2024

1. Aims, Objectives, and Scope

- **Aim**:

  - The primary aim of this e-learning platform is to provide accessible, high-quality, and engaging online education to learners across diverse demographics. By creating a user-friendly and interactive platform, this project will deliver online courses in English and Mathematics that support self-paced and instructor-led learning. The platform will prioritise personalised learning paths and interactive content to enhance learner engagement and knowledge retention.

- **Objectives**:

  - To develop a platform that enables users to study from any location, providing flexibility and convenience in learning.

  - To create an engaging and enjoyable learning experience, reducing the challenges often associated with studying.

  - To make the learning process efficient, helping users understand new concepts quickly and retain information effectively.

  - To design features that simplify complex topics, ensuring that new learners do not face the difficulties often encountered in traditional study methods.

  - To offer a supportive, user-centred educational environment that motivates learners and enhances their ability to improve and grow independently.

- **Scope**:

  - **Inclusions**: This project will be designed for students looking to master these subjects at a fundamental to intermediate level. The technological stack will only include HTML, CSS, and JavaScript, with an emphasis on developing a user experience that is both aesthetically pleasing and responsive. The platform's primary features are a catalogue of available courses, basic user profile capabilities to store learning progress, and interactive material that encourages user participation. The primary audience comprises school-age students and independent learners who want to improve maths and English. Due to its emphasis on front-end development, the platform will mainly provide self-paced learning with few instructor-led components. It will not incorporate sophisticated back-end services like data storage or payment systems.

- o **Exclusions**: This project will not include high-level or advanced study content; it will contain only fundamental content to enable learners to concentrate on their skill level and get their fundamentals ready for the advanced level. In this project, I plan to improve the content after even functions on the website are settled and there are no errors. It will allow learners with good fundamentals to progress to advance content on the platform.

2. Definition of the Problem

- **Problem Description**:
  - o Many learners face significant challenges with studying due to a lack of accessible, engaging resources that foster motivation and enjoyment in the learning process. Traditional learning environments often lack the flexibility needed to allow learners to study at their own pace and from any location, limiting their ability to tailor the experience to their needs. Additionally, most study materials need more interactive elements that make learning enjoyable, causing many students to find the process tedious and unappealing. Complex subjects are often presented in ways that could be clearer, particularly for new learners, resulting in confusion and discouragement. Inefficiencies in traditional methods also make it challenging for learners to retain information effectively and progress smoothly, ultimately hindering their educational journey. There is a growing need for a platform that combines accessibility, enjoyment, and efficiency in one cohesive experience, providing new learners with a better and more supportive educational journey and sparing them from the struggles commonly encountered in traditional learning settings.

- **Significance**:
  - o This project aims to provide essential foundational content for learners with little prior experience, such as primary school students seeking to improve their skills. The platform's most significant advantage is its focus on two core subjects—English and Mathematics—allowing learners to choose between them without relying on multiple platforms. By offering these critical subjects in one place, the project ensures a more streamlined and accessible learning experience, supporting students in building vital skills in both areas.

3. Background Review

- **Key Findings (Literature / Systems)**:

  - I have conducted background research on multiple e-learning platforms, examining the unique features and functionalities they offer to enhance learning experiences. The platforms I reviewed include Duolingo, Talkie, Udemy, Coursera, and Khan Academy, each offering distinct features designed to help learners improve their skills efficiently and enjoyably.

  - However, despite their strengths, these platforms reveal some notable gaps in current e-learning offerings. Many platforms need more subject variety in foundational education (particularly for younger or less experienced learners) or focus on advanced content with more support for beginners. Additionally, while some platforms use gamification to make learning more engaging, they do not combine personalised feedback, interactive exercises, and structured foundational content in a cohesive experience designed explicitly for primary-level learners. Moreover, accessing multiple subjects often requires switching between platforms, which can be inconvenient for learners and disrupt the learning flow.

  - This project addresses these gaps by creating an integrated platform focused on core foundational subjects, such as English and Mathematics, designed specifically for young or less experienced learners. By combining interactive and gamified learning elements with clear, step-by-step guidance, this platform will provide a more enjoyable and efficient way for beginners to build strong foundational skills. Additionally, the project will offer both subjects in one place, eliminating the need to switch between platforms. Ultimately, this platform will deliver a supportive, engaging learning experience that addresses the current limitations in the e-learning landscape for novice learners.

- **Comparison with Similar Software Applications/Products**

  - **Duolingo:**

    - **Strengths:** Duolingo makes language learning engaging and fun through its gamified approach, using interactive

quizzes, rewards, and daily streaks to motivate users. It is especially effective in keeping users committed to daily practice, a significant factor in language acquisition.

- **Weaknesses:** Duolingo is famous for language learning but needs more in-depth support for other subjects beyond languages. Additionally, its gamified approach, though engaging, may not provide the structured, foundational learning that primary-level learners need in subjects like Mathematics and English.

- **Khan Academy:**
  - **Strengths:** Khan Academy is well-regarded for offering various free educational resources across multiple subjects, particularly Mathematics and Science. It provides mastery-based progression, which allows learners to understand concepts thoroughly before advancing, making it ideal for building a solid foundation.
  - **Weaknesses:** Khan Academy, while comprehensive, is often designed for a broader audience, including older students. The platform can feel overwhelming for young or less experienced learners, as the interface is more content-focused and needs more engaging, interactive features better suited for younger students or beginners.

- **Udemy**:
  - **Strengths**: Udemy offers various courses across various subjects, allowing users to choose from beginner to advanced content. It supports flexible learning by providing structured video lectures, quizzes, and supplemental resources, making it useful for self-paced learning.

  - **Weaknesses**: Udemy is primarily designed for adult learners and professionals seeking skill development, so its courses may not be suitable for primary-level students. Additionally, the courses can be costly, and some content lacks the interactive, hands-on elements essential for younger learners' engagement.

- **Differentiation**:
  - This project will build upon and differ from these existing products by combining the most effective elements while addressing their limitations for younger or beginner learners. Unlike Duolingo, this platform will focus on core subjects beyond languages, specifically English and Mathematics, with a structured curriculum tailored to

primary-level learners. Drawing from Khan Academy's strength in foundational education, our platform will provide structured, step-by-step learning but with a more interactive and gamified approach to make it engaging for younger students. Unlike Udemy, which targets adult learners, our project will prioritise accessibility, affordability, and age-appropriate content, providing interactive exercises, instant feedback, and visual aids to ensure a smooth and enjoyable learning experience. Overall, this platform will integrate the strengths of these applications into a cohesive, beginner-friendly educational environment focused on foundational skill-building for younger learners.

4. Tools (Hardware/Software)

- **Software**:

  o Visual Studio (VS code) will be the only IDE that I will use for this project; it is suitable and is an excellent choice for HTML coding, widely favoured by developers for its user-friendly interface, extensive customisation options, and support for multiple languages, including HTML, CSS, and JavaScript. It offers intelligent code suggestions with IntelliSense, which provides smart autocompletion for tags, attributes, and values, allowing for faster coding and fewer errors.
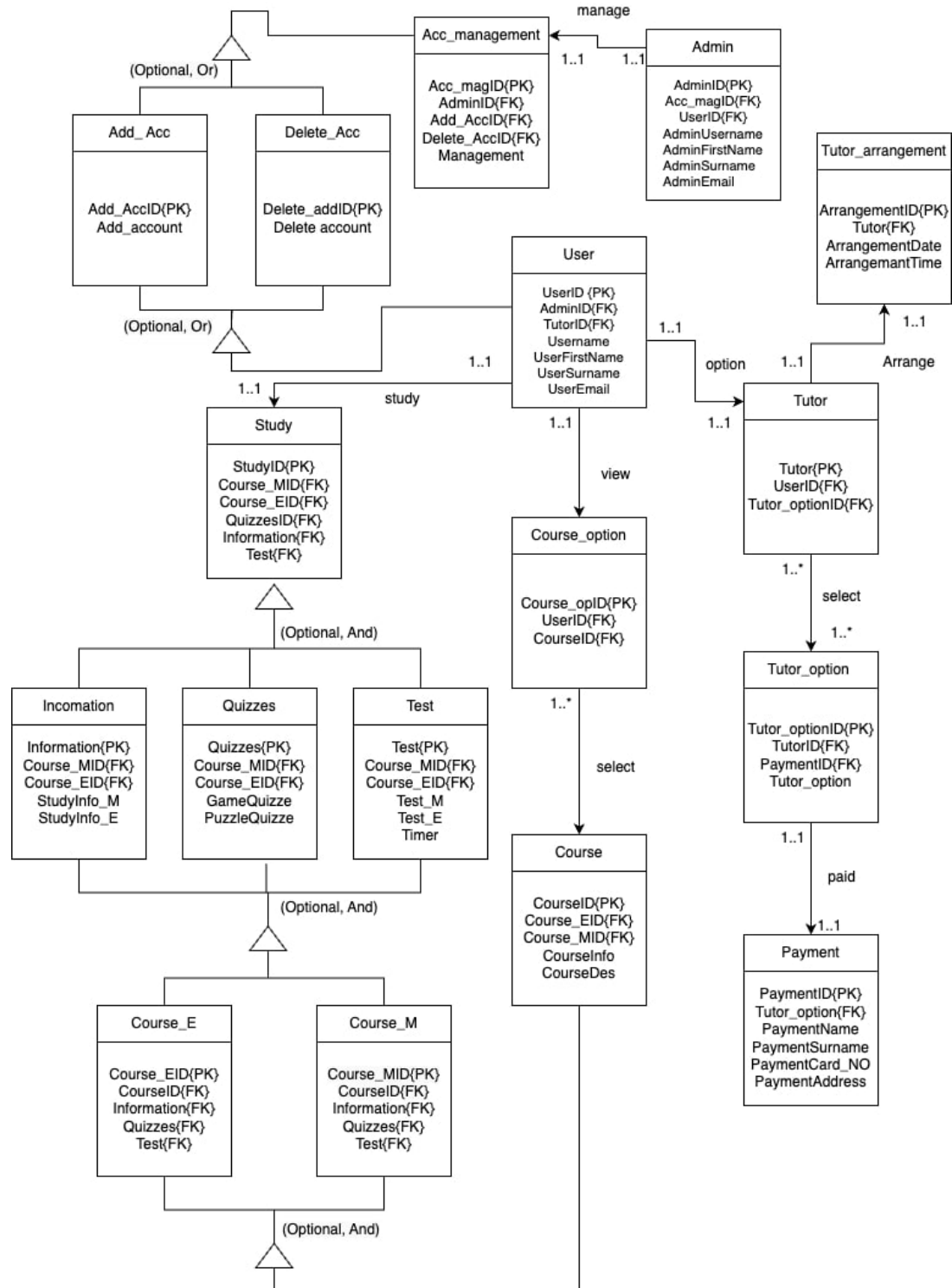
5. Use Cases and Diagrams

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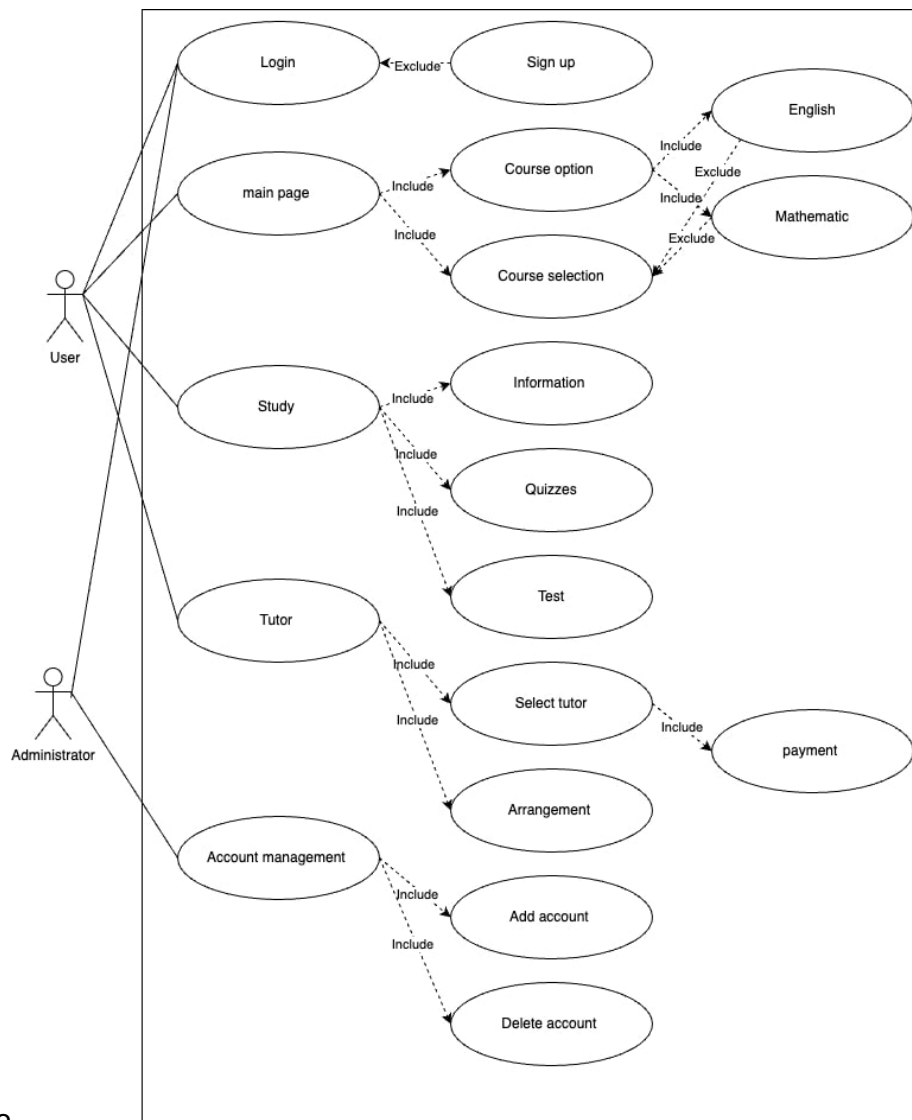
- **Use Case**:

  o The system is designed to support learners and administrators in achieving educational goals through streamlined course selection, interactive learning, personalised tutoring, and efficient account management. Learners can register, log in, and select foundational courses in English or Mathematics, accessing structured content, quizzes, and tests that encourage active learning and retention. They can choose qualified tutors for additional support, with some sessions requiring payment.

  o Administrators handle essential platform management through "Account Management" for adding or removing user accounts and oversee tutor scheduling to ensure

availability. This cohesive setup provides students with a focused, interactive learning experience while enabling administrators to uphold platform quality and security, fostering a reliable and effective educational environment.

- **Diagrams**:

Admin Use Cases:

- o **Account Management**: The admin has access to manage accounts, including the option to add or delete user accounts as needed. The admin can handle account creation (Add_Acc) and deletion (Delete_Acc) through the Acc_management entity, allowing comprehensive control over the user base.

User Use Cases:

- o **Account Creation and Login**: Users, once registered, can log in to access various services provided by the platform. They are associated with a unique User ID and have their personal information stored in the User entity.
- o **Course Selection and Study**: Users can select courses through the Course_option entity, choosing between subjects like English (Course_E) and Mathematics (Course_M). Each course provides access to **Information**, **Quizzes**, and **Tests**, making learning engaging and interactive.
- o **Viewing Course Information**: Before starting a course, users can review course details, descriptions, and study materials.
- o **Study and Practice**: Within each course, users can study (Study entity) the material provided, engage in quizzes (Quizzes entity), and complete tests (Test entity) to assess their knowledge. The quizzes and tests are designed to reinforce learning and improve retention.

Tutor Use Cases:

- o **Select Course Options**: Tutors are associated with specific course options and can select relevant courses to teach or provide support. This is managed through the Tutor option entity.
- o **Session Arrangement and Payments**: Tutors can coordinate with the admin to make session arrangements. Payments are managed through the Payment entity, where tutors receive payments after delivering services. The payment information for tutors is securely stored within this entity.

Tutor Arrangement: Admins can manage tutor arrangements, which include scheduling sessions and assigning tutors to specific learners. The Tutor arrangement entity facilitates this, allowing the admin to organise tutor availability and user interaction.

6. Requirements Elicitation

- **Approach**:
    - Surveying an online form is an effective method for gathering data from a diverse group of respondents, facilitating the analysis and refinement of the project focus. To ensure broad participation, the survey form was distributed online and shared with friends and family, providing a range of perspectives that can inform this project.

- **Techniques**:
    - The structured survey form is designed to collect input from both adults and children. It includes sections where respondents can share their experiences with education from their childhood, as well as provide insights into current educational challenges and preferences. For younger participants, questions are tailored to capture their interests and preferred learning methods, offering a valuable perspective on contemporary learning needs.

    - In addition to the survey, observing students as they engage with existing e-learning platforms allows for identifying specific pain points and potential improvements in usability, engagement, and accessibility. This observational method is particularly beneficial for understanding how children interact with digital learning tools, highlighting aspects that could be enhanced to optimise the user experience and effectiveness of the platform.
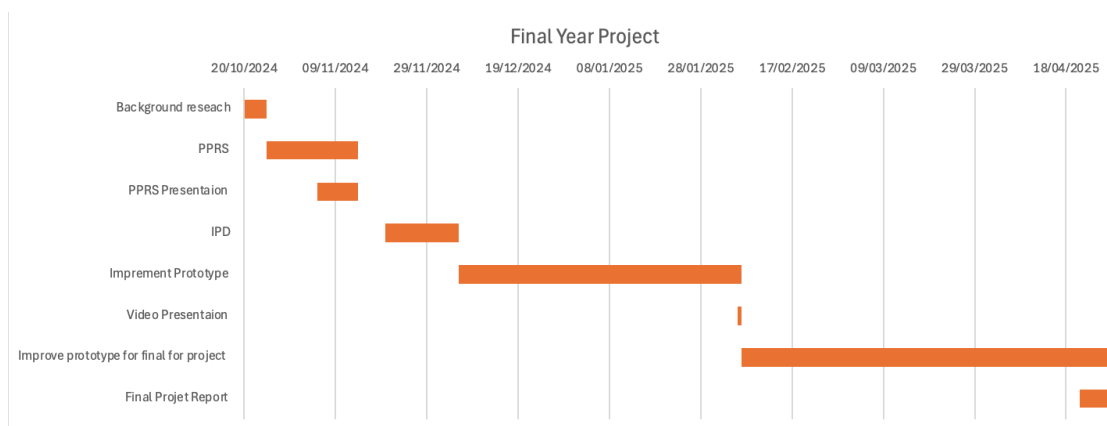
7. Time Schedule

Gantt Chart

    Staring 25 October 2024

    Submission 28 April 2025

      Duration 7 Months = 28 Weeks

Final Year Project

8. References / Bibliography

- Clark, R.C. and Mayer, R.E., 2016. *E-Learning and the Science of Instruction: Proven Guidelines for Consumers and Designers of Multimedia Learning*. 4th ed. Hoboken: Wiley.

- Dhawan, S., 2020. *Online Learning: A Panacea in the Time of COVID-19 Crisis*. Journal of Educational Technology Systems, 49(1), pp.5–22. Available at: https://doi.org/10.1177/0047239520934018.

- Kearsley, G., 2011. *Online Learning: Personal Reflections on the Transformation of Education*. Educational Technology, 51(3), pp.29–34.

- Moore, J.L., Dickson-Deane, C. and Galyen, K., 2011. Are *E-Learning, Online Learning, and Distance Learning Environments the Same?* The Internet and Higher Education, 14(2), pp.129–135. Available at: https://doi.org/10.1016/j.iheduc.2010.10.001.

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- Sun, A. and Chen, X., 2016. *Online Education and Its Effective Practice: A Research Review*. Journal of Information Technology Education: Research, 15, pp.157–190. Available at: https://doi.org/10.28945/3502.

o Zhang, D., Zhao, J.L., Zhou, L. and Nunamaker, J.F., 2004. *Can e-learning replace classroom learning?* Communications of the ACM, 47(5), pp.75–79.

9. Ethics Form

UNIVERSITY OF WESTMINSTER⊞ ⊞ **SCHOOL OF COMPUTER SCIENCE AND ENGINEERING**

Final Year Project Research Project Submission Form

Section 0: Applicant's info

Applicant's Full Name:	Pakapon Pakdesupaphol
Applicant's University ID number:	19097556
University Email Address:	w1909755@westminster.ac.uk
Select your level of study:	Undergraduate

Section 1: Project Info

1.1. Supervisor's Full Name:	Nagandiram Sadeseevam
1.2. Supervisor's Email Address:	S.Nagandiram02@westminster.ac.uk
1.3. Project Title:	Develop e-learning platform Website
1.4. Please provide a description of the background with references to relevant literature (250 words):	I have used several platforms before and would like to implement my own to make it more suitable than other market platforms such as the most famous application, Duolingo, talkie, Coursera, Khan Academy, etc. Duolingo had a function that helped the learners quickly and efficiently, and I will use that function as a reference to implement my website. I have decided to use an elearning website to have two subjects, Mathematics and English for beginners, which will support kids who want to spend extra time learning up to adults who are working and want to improve in the area that they have been lacking.
1.5. Please provide a brief description and the aims of your study (250 words):	My aim for this project is to implement a website that allows people to study on an E-learning platform based on their level. This will include gathering user information to store the data and track the process of their learning. The learning process will be more like a quiz with multiple choices. The project will use three different languages: HTML, CSS and Javascript.
1.6. Please outline the design and methodology of your study and details of any invasive or intrusive procedures (400 words):	This project will provide two subjects for e-learning on the website; also, the learners can ask a tutor to do online teaching; this feature will be a feature that needs to be paid to do so. The learning style will be more like quizzes, such as multiple choice, drag and drop,

	rearranging sentences or, correcting photos, etc. Those quizzes' functions and interactions will be created by using Javascript combined with CSS and HTML to provide a seamless function and better experience. The accounting, such as user name and password, will be provided on this website to help track and store user data to make sure learners are able to continue learning where they were left off, which means front ends and back ends are needed to help track and store data.
1.7. Project Start Date:	2024-10-01
1.8. End Date of Work:	2025-04-28

Section 2: External Factors

2.1. Does your research include funding from an external organisation and/or external collaborator/s or co-Investigator/s?:	NO
2.2. Are you seeking ethical approval from the Health Research Authority (HRA)?:	NO
2.3. Are you seeking University sponsorship (as defined by Health Research Authority)?:	NO
2.4. Are you seeking ethical approval from any other external organisation (which is not the Health Research Authority)?:	NO
2.5. Have you been asked by an external organisation to produce evidence of ethical approval for your research?:	NO

Section 3: Participants

3.1. Does this research proposal (as proposed to Research Ethics Committee in its current status) include Research Participants (humans and/ or animals, either deceased or alive)?:	NO
3.2. If your research fieldwork (virtual or in person) will not be carried out on University premises, please state the location of your research.:	virtual
3.3. Human participants in Health and Social Care settings?:	NO
3.4. Human participants who may be deemed vulnerable due to their setting(s)?:	NO
3.5. Expectant or new mothers?:	NO
3.6. Refugees or asylum seekers or recent migrants?:	NO
3.7. Minors (under the age of 18 years old)?:	NO
3.8. Participants in custody (e.g. prisoners or arrestees)?:	NO
3.9. Participants who may potentially fall under the remit of the Mental Capacity Act?:	NO

3.10. Are animals (or animal tissue) involved?:   NO

Section 4: Risk of harm

4.1. Will any pain or more than mild discomfort result from the study?:   NO

4.2. Could the study induce any psychological stress or anxiety or cause harm or negative NO consequences beyond the risks encountered in normal life?:

4.3. Will the study involve prolonged or repetitive physical or psychological testing of NO human participants that may put someone at risk, e.g. use of treadmill?:

4.4. Will the study involve raising sensitive topics (e.g. sexual activity, drug use, revelation NO of medical history, bereavement, illegal activities, etc.)?:

4.5. Does your work involve relevant material, defined by the Human Tissue Act as   NO material other than gametes, which consists of, or includes, human cells. In the Human Tissue Act, references to relevant material from a human body do not include: (a) embryos outside the human body, or (b) hair and nail from the body of a living person.
Work falling under the Human Tissue Authority.:

4.6. Will DNA samples be taken from human participants?:   NO

4.7. Does your study raise any issues of personal safety for you or other researchers NO or participants involved in the project (especially relevant if taking place outside working hours or off-site e.g. not on University premises)?:

4.8. Does your study involve deliberately misleading the participants (e.g. deception, NO covert observation)?:

4.9. Does your work involve administration of a food or non- food substance of a   NO different type from or in abnormally higher or lower amounts than normal or one that is known to cause allergic reaction(s) or potential psychological stress?:

4.10. Does your study involve issues relating to personal and/or sensitive data?:   NO

4.11. Does your research involve any 'security sensitive' material? See Universities UK NO Oversight of Security Sensitive Research Material (2019).:

4.12. Does your research ethics proposal include off- site (i.e. not on University premises) NO research fieldwork and travel involving face to face interactions?:

Section 5: Information to participants

5.1. Will you provide participants with a Participant Information Sheet prior to obtaining YES informed consent?:

5.2. Will you describe the procedures to participants in advance, so that they are informed YES about what to expect?:

5.3. Will you obtain informed consent for participation (normally written)?:   YES

5.4. Will you tell participants that they may withdraw from the research at any time and YES for any reason?:

5.5. Will you give participants the option of omitting questions they do not want to   YES answer?:

5.6. Will you tell participants that their data will be treated as confidential and that, if YES published, it will not be identifiable as theirs?:

5.7. Will you offer feedback to participants at the end of their participation, upon YES request (e.g. give them a brief explanation of the study and its outcomes)?:

The applicant confirmed and agreed the following statements:

* The information I have given on this form is true, complete and to the best of my knowledge correct.
* They have read the University's Code of Practice Governing the Ethical Conduct of Research.
* The information provided on this form is subject to the Data Protection Act 2018, General Data Protection Regulation (GDPR) 2018 and the Freedom of Information Act 2000.
* This form may be disclosed as a result of a GDPR Subject Access Request.
* This form may be disclosed as a result of a request for information under the Freedom of Information Act 2000.

• They must ensure that any subjects selected for study are made aware of their rights and our obligations under the Data Protection Act 2018 and General Data Protection Regulation (GDPR) 2018. • They must ensure that sponsors are made aware that the University of Westminster is subject to the Freedom of Information Act 2000.

Applicant's signature

Supervisor's signature

___P Pakdesupaphol___
Date: __12/11/2024__

__S Nagandiram__
Date: _12/11/2024_

This form was completed and submitted by the applicant [Pakapon Pakdesupaphol] on Tuesday 5 Nov 2024

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