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Faculty of Science and Engineering UG and PGT Ethics Application

To continue, you must confirm that you have read and understood the University of Hull Research and Governance Policies regarding Ethics.	I can confirm that I have read and understood the relevant policies

Applicant Information

Name	Obinna Eke
Student Number	202137272
School or Institute	Computer Science
University of Hull Student Email Address	o.a.eke-2021@hull.ac.uk
Project title	A Tutorial System for Python
Module Number	700099

Please write a brief summary of your research aim(s), objective(s), question(s) and/or hypothesis(es).

One major area of education which is still being fine-tuned to achieve maximum yield is the area of programming languages. Several lecturers (in the IT Sphere) have found it quite demanding, inefficient and suboptimal to use the most common approach of transferring programming language knowledge due to the complexities involved in accessing a student's level of knowledge. Several lines of programming code can be wrongly marked because of either time-constraint, complexity of input or irregular (but correct) algorithm among others. A sample case is the "Advanced Computational Science" module being taught to students of Advanced Computer Science (M.Sc.) students using python. Currently, the approach to students assessments is: Students access their assessments tasks from the module on Canvas. Students navigate to Jupyter Notebook to complete and test the task. Lecturers have to access students work from Jupyter Notebook (to view the output) or review the raw .txt data. As detailed above, there are several problems with the current system that makes it quite cumbersome and suboptimal for both the students and lecturers. Students cannot view their performance in real-time(in relation to the specification of the task) and Lecturers have to access each student's progress by accessing individual workstations. This process can be optimized greatly by building a tool to manage the both the logical and computational tasks, as well as the performance assessment. This project will consist of a Frontend UI, a Backend system, a middleware implementation and Database. The objective of this project is to create an automated system of transferring knowledge to students, assessing their performances and providing timely rendition of performances. The scope of this project will be limited to Python (beginner - intermediate programming level) and a few use cases will be demonstrated accordingly. The project can be scaled further to automate mundane, repetitive and redundant tasks associated with the transfer of knowledge in the educational sector.

Please add your project start date:	Jun 2023
Please add your project end date:	Sep 2023
Is ethical approval already in place for this research project?	No

Research Methodology

Type(s) of research methods to be used	Research using data from social media platforms Other

Details of Research Methods

Please outline your planned research methodology:

The research design will use a mixed-methods approach, incorporating both quantitative and qualitative methods. It aims to develop a software tool (automated system) and assess its effectiveness in transferring knowledge and evaluating student performance in Python programming.

Data Collection:
This scope of this project does not demand extensive data gathering, as agreed with my supervisor on Teams video call during our last meeting. It is a Tutorial Portal (prototype) designed to facilitate lecturers to carry out their obligations. Tutorials and assessments are already being handled online via canvas, the only challenge is that canvas can not currently handle assessments for Programming Languages. That is the aim of this project, leveraging on online resources to assess students performance in programming language(s) with Python programming language being the sample use case study. For the scope of this project, there will be no information gathering, just close and constant engagement with my project supervisor to confirm that the application meets its utility and functional requirements.

The development of the automated system will encompass designing and creating various components, including the Frontend UI, Backend system, middleware, and Database. The Agile development methodology will be adopted to enable a process of continuous feedback and iterative improvements throughout the development stages.

Implementation:
The platform will be implemented as a standalone and several test cases will be adopted from the previous Advanced Computational Module to process its evaluation.

The automated system can later be integrated into the current learning management system (Canvas) used for the module. Students can then be requested to utilize this system to complete their programming tasks, and their performance data will be automatically logged. An evaluation of the system will be conducted over a specific period to gather performance data and assess its influence on students' learning outcomes. Note that this is not within the scope of this project, this is a post implementation suggestion and is entirely within the university's admin purview.

Data Analysis:
Quantitative data, including sample performance metrics generated from the testing, will be analyzed using statistical methods to measure the effectiveness of the automated system in comparison to the manual assessment process.

Evaluation/Testing:
Testing of this project will be done via Unit Testing, where several units of the project are isolated and subjected to various tests to verify and validate its correctness. Students will not be required to test the application, as the

Unit Testing software technique will be used and its results documented.

Please describe the ethical issues arising from your research plans and how they will be addressed:	The first and foremost, most frequent issue arising from any project is consent. As earlier postulated, this is not within the scope of this project. However, if and where necessary, my Project supervisor will be consulted and if approved, duly informed consent will be obtained from all participants before data collection. The essence of this project is just to provide a test case that can be improved on, hence its implementation as a standalone unit. Research Data retrieved from observation and sample test cases will be stored securely, as postulated in the GDPR regulations. Publication and Authorship: Ensure proper acknowledgment and authorship for all ideas, concepts and modules that will be used in the development of this project and give sufficient credit where due. Responsible Use of Technology: Ensure that the automated system is used responsibly and ethically, without enabling any form of cheating, plagiarism, or academic misconduct. This project will adhere to ethical guidelines and institutional regulations.

Data Management Plan

When you conduct your research, will you be generating new information or data?	No

Submitting your Ethics Application