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CHANGEMAKERS: CREATIVITY & VALUE CREATION

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**Module: Changemakers: Creativity and Value
Creation**

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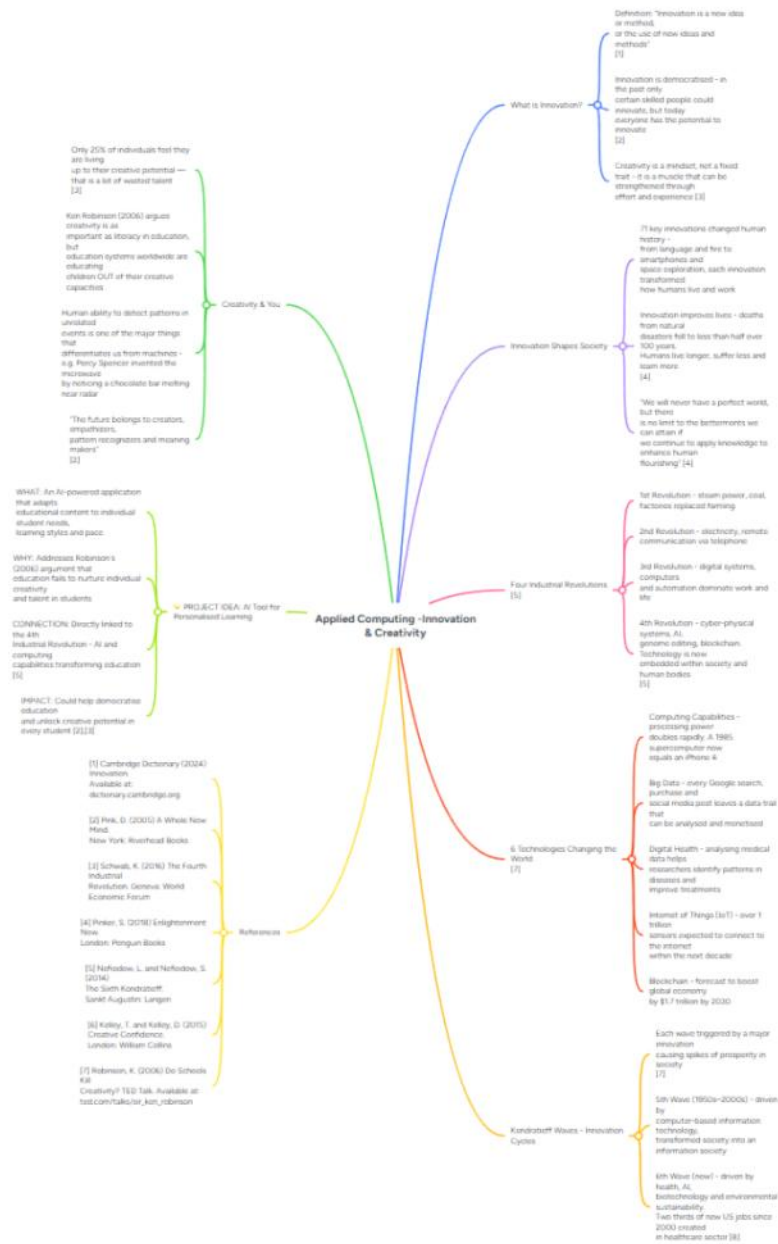
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**Project Title: AI Tool for Personalised Learning
in Higher Education**

Task 1

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Task 2

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Q1. Aim and Objectives

AIM:

To investigate and compare existing AI-powered tools for personalised learning in higher education, in order to identify key features that enhance student engagement and academic performance.

OBJECTIVES:

1. To review existing literature on AI-powered personalised learning tools and their application in higher education [8]
2. To identify and compare current AI learning tools (such as Khanmigo, Coursera AI and Duolingo) based on features, accessibility and effectiveness
3. To gather qualitative data from students and educators regarding their experiences and perceptions of AI learning tools
4. To analyse findings and identify which features of AI tools are most beneficial for personalised learning
5. To provide recommendations for the development or adoption of AI learning tools within Applied Computing programmes

Q2. Research Philosophy

Research philosophy refers to the beliefs and values that shape how a researcher collects, analyses and uses data in their project [8].

Every researcher brings personal assumptions to their work, influenced by three key philosophical concepts: Ontology (the nature of reality), Epistemology (the nature of knowledge) and Axiology (the role of values in research) [8].

This project will adopt an Interpretivist research philosophy. Interpretivism recognises that reality is subjective and socially constructed - different people experience and interpret the same phenomenon in different ways [9].

This philosophy is appropriate because the research focuses on understanding the opinions, experiences and perceptions of students and educators regarding AI learning tools. Rather than seeking fixed numerical facts, this study aims to explore the meaning people attach to their experiences with technology in education [10].

Interpretivism aligns with qualitative data collection methods such as interviews and open-ended surveys, which allow participants to express their views in depth. This contrasts with Positivism, which focuses on measurable, objective data and is more suited to scientific or quantitative studies [11].

Furthermore, as highlighted in Topic 2, our personal beliefs and values naturally influence our research approach. As the researcher has a personal interest in AI and education, an interpretivist approach allows for a more reflective and human-centred investigation into how students interact with and benefit from AI-powered learning tools.

Q3. Search Tools and Research Databases

as noted by Saunders et al. (2019) [7], before beginning any research it is important to understand what is already known about a topic - the "known knowns" - and what remains uncertain - the "known unknowns" [8].

In this project, it is already known that AI tools exist in education (known known), however the specific impact of these tools on personalised learning in Applied Computing programmes remains uncertain (known unknown). This gap in knowledge justifies the need for further research.

To explore this gap, the following databases will be used. Topic 3 notes that most published research uses between 4 and 8 databases [8]:

1. IEEE Xplore (ieeexplore.ieee.org)
- specialist database for computing and technology research, highly relevant for AI tools and systems [5]
2. ACM Digital Library (dl.acm.org)
- key database for computer science, contains papers on AI, machine learning and educational technology
3. Google Scholar (scholar.google.com)
- broad academic search engine for peer-reviewed articles and conference papers on AI in education
4. ERIC (eric.ed.gov)
- education-focused database for research on student learning outcomes and technology in education
5. ScienceDirect (sciencedirect.com)
- multidisciplinary database covering technology and social sciences research

Boolean search strategies will be used to refine results, as recommended in Unit 1 Topic 3 [8]. These include:

"AI" AND "personalised learning" AND "higher education"
"artificial intelligence" AND "student engagement"
"adaptive learning systems" AND "effectiveness"
"AI tools" AND "education" NOT "primary school"

Quotation marks will be used for exact phrases. AND will narrow results, OR will broaden them, and NOT will exclude irrelevant terms. Date filters (2015-2024) will ensure currency of sources (Booth et al., 2016) [9].

Additionally, a systematic approach to identifying themes will be used - scanning titles and abstracts first before reading full papers, to efficiently identify the most relevant literature for this project.

Task 3

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Q1. Validity, Reliability, Generalisability and Ethics

When conducting research it is essential to consider strategies that enhance the quality and credibility of the findings [6].

VALIDITY

Validity refers to whether the research actually measures what it intends to measure. To enhance validity in this project, multiple data collection methods will be used (triangulation) - combining surveys and interviews to cross-check findings. Questions will be carefully designed to directly relate to the research aim and objectives [7].

RELIABILITY

Reliability refers to whether the research can produce consistent results if repeated. To enhance reliability, the same survey questions will be used with all participants, and interviews will follow a structured set of questions. This ensures that results are not influenced by inconsistencies in data collection[10].

GENERALISABILITY

Generalisability refers to how far the findings can be applied to a wider population. As noted in Unit 2 Topic 2, not all research needs to be as extensive as the UK Census [4]. This project will use a small sample of students and educators, so generalisability will be limited. This limitation will be clearly acknowledged in the research, as recommended by the module material [5].

ETHICAL CONSIDERATIONS

Ethics are a critical part of any research involving people. The following ethical principles will be applied in this project:

- Informed consent: all participants will be told the purpose of the research before taking part
- Anonymity: no names or identifying information will be collected or published
- Right to withdraw: participants can leave the study at any time without consequence
- Data protection: all data will be stored securely and used only for this research project [11].

Additionally, the Hawthorne Effect must be considered - when people know they are being observed they may behave differently, which can bias results [11]. To minimise this, surveys will be anonymous and self-completed rather

than observed.

Q2. Research Strategies and Data Collection Methods

Based on the interpretivist philosophy identified in Task 2, this project will use qualitative data collection methods to gather rich, detailed insights from participants [12].

PRIMARY DATA COLLECTION METHODS:

1. Online Survey (Questionnaire)

A self-completion online survey will be distributed to Applied Computing students. The survey will include open-ended questions about their experiences with AI learning tools. This method is practical, cost-effective and allows collection of data from multiple participants quickly [14].

2. Semi-structured Interviews

A small number of interviews (approximately 5-8) will be conducted with students and educators. Semi-structured interviews allow flexibility for participants to expand on their answers, providing deeper insight into their experiences with AI tools [13].

SAMPLING STRATEGY:

As identified in Unit 2 Topic 2, qualitative research typically focuses on a limited number of respondents due to time and resource constraints [12]. This project will use:

- Typical case sampling - focusing on Applied Computing students who represent the average experience of using AI tools in their studies
- Snowball sampling - asking initial participants to recommend others who may have relevant experience

PILOT DATA COLLECTION:

A pilot survey was designed and distributed to a small group of 3-5 participants to test the clarity and relevance of the questions before the main data collection.

Feedback received was used to improve the focus and wording of the questions. See Appendix A for the pilot survey and feedback received.

Q3. Quantitative and Qualitative Analysis

as identified by Creswell (2014) [9], there are two main types of data analysis: quantitative and qualitative [10][12].

QUANTITATIVE ANALYSIS

Quantitative analysis involves the use of numerical data and statistics to identify patterns and trends. There are two main types:

1. Descriptive Statistics

Used to summarise and describe a dataset.

Examples include:

- Mean (average) - the middle point of a collection of numbers
- Frequency - counting how many times a particular answer occurs

As noted in Topic 1, descriptive stats give research a sense of gravitas that vague sentences cannot provide [8].

2. Inferential Statistics

Used to make conclusions and predictions from data. These help determine:

- Which variables have the most effect on the subject being studied
- Whether a hypothesis is true or false

Inferential stats also identify correlations:

- Positive correlation: as one variable increases so does the other
- Negative correlation: as one variable increases the other decreases
- Zero correlation: no relationship between variables [12]

QUALITATIVE ANALYSIS

Qualitative analysis involves identifying patterns and themes in non-numerical data such as interview responses and open-ended survey answers.

1. Thematic Analysis

A popular method used to identify patterns or themes that emerge from qualitative data. as argued by Bryman (2016), thematic

analysis follows six steps and is effective in answering a wide range of research questions [11]. For this project, thematic analysis will be used to identify common patterns in student and educator opinions about AI learning tools.

2. Content Analysis

Involves systematically categorising and coding qualitative responses to identify recurring concepts and ideas [11].

For this project, thematic analysis will be the primary method as it aligns with the interpretivist philosophy and qualitative data collection approach chosen in Task 2.

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APPENDIX A

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Appendix A: Pilot Survey and Feedback

A pilot survey was conducted with 4 participants to test the clarity and relevance of the research questions prior to main data collection. Feedback was used to refine the focus of the project.

PILOT SURVEY: AI Tools for Personalised Learning in Higher Education

Thank you for taking part in this pilot survey. All responses are anonymous. This should take approximately 5 minutes.

Q1. Do you currently use any AI tools to support your studies?

- ☐ Yes
- ☐ No
- ☐ Sometimes

Q2. If yes, which AI tools do you use?
(e.g. ChatGPT, Grammarly, Duolingo)
[Open answer]

Q3. How would you rate your overall experience with AI learning tools?

- ☐ Very positive
- ☐ Positive
- ☐ Neutral
- ☐ Negative
- ☐ Very negative

Q4. In your opinion, do AI tools help personalise your learning experience?
Please explain your answer.
[Open answer]

Q5. What features of AI tools do you find most useful for your studies?
[Open answer]

Q6. What improvements would you suggest for AI learning tools used in higher education?
[Open answer]

PILOT FEEDBACK SUMMARY

After distributing the pilot survey to 4 students, the following feedback was received:

Participant 1: Suggested adding a question specifically about which subject areas benefit most from AI tools.

Participant 2: Found Q4 slightly unclear - suggested rewording to make "personalised learning" clearer.

Participant 3: Suggested adding a question about concerns or limitations of AI tools in education.

Participant 4: Positive overall, suggested the survey was clear and easy to complete.

IMPROVEMENTS MADE AS A RESULT:

- Q4 was reworded for clarity
- A question about limitations of AI tools was added to the main survey
- A question about specific subject areas was added to the main survey

This pilot process helped to improve the focus and clarity of the research instrument before main data collection.