

ACCA5033

Monday, August 18, 2025 11:36 AM

Module Code: ACCA5033

Module Title: Changemakers: Creativity and Value Creation

Student Name: Rachid Aboulachouaq

Student Number: 2237654

Student Email: 2237654@student.uwtsd.ac.uk

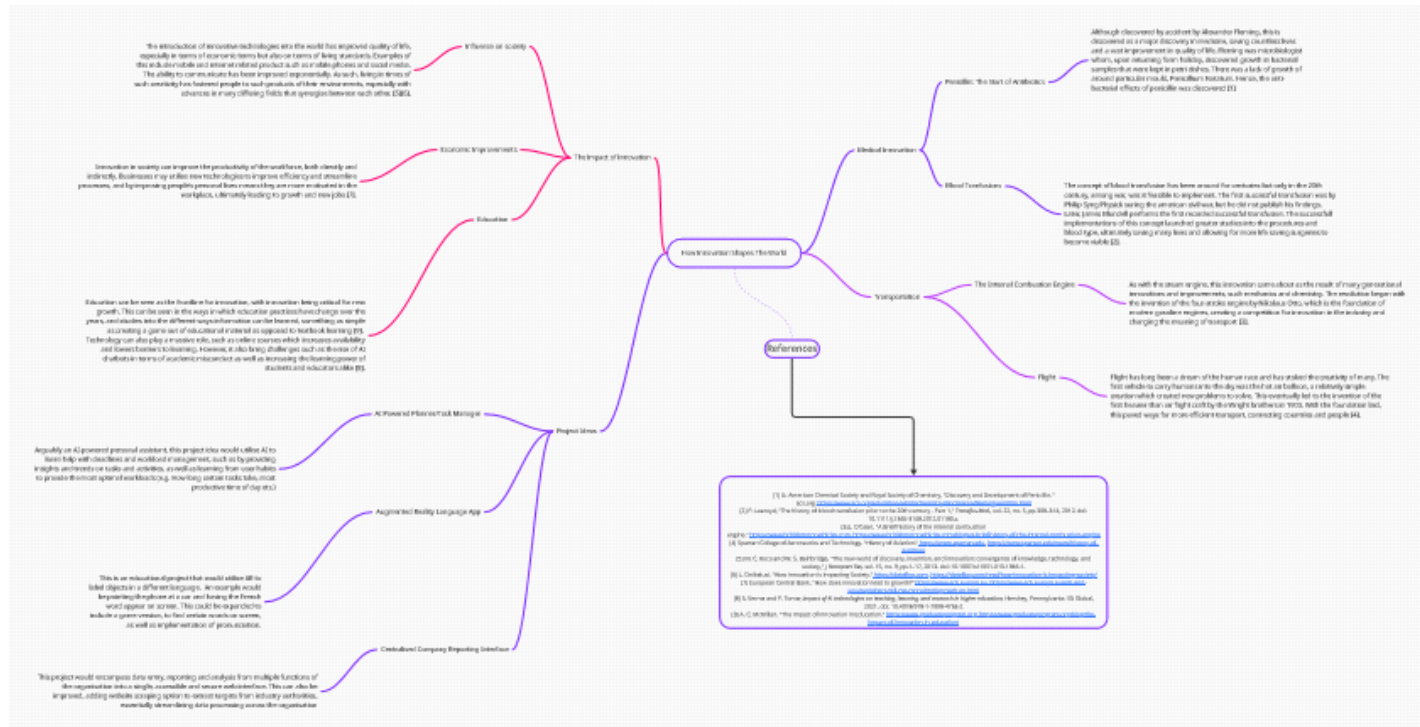
Word Count : 1736

Task 1: Mind Map

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Mind Map



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Task 2 Aims & Objectives

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Aim

The primary aim of this project is to design and develop an augmented reality learning application that uses real-time recognition to translate identified objects into another language for an enhanced learning experience.

Objectives

Design

- Research and design an application that utilises augmented reality (AR) software and the device camera to identify object through the camera
- Download Language dictionary and integrate translation, pronunciation and display name in the chosen language.

Enhanced Learning

- Implement additional learning features such as sentence structures and learning games
- Add progression tracking and personalised vocabulary/grammar lists for revision of material

User Experience

- Develop accessible and intuitive user interface suitable for all learners, as well as observing accessibility guidelines
- Implement speech recognition to allow users top practice pronunciation of words as well as learner feedback

Evaluate and Test

- Conduct testing with users to ensure that usability, learning and engagement are effective

The research philosophy chosen for this project will be ontology, specifically subjective ontology.

This was chosen as the experience of learning depends upon the person receiving the learning, as well as the way it is delivered. By looking at people's experiences of the AR application (system), it is possible to provide a more enriching experience based upon the individual's needs [1].

Some search tools include:

Google Scholar – This is a free academic search engine that covers academic literature across a number of disciplines, including journal articles, conference papers etc. Key aspects of this include the fact it is a free search tool, is easy to use and has broad coverage of many fields. However, some of these may not be fully comprehensive. It is particularly useful for citations [2].

IEE Xplore – This search tool is digital library containing academic literature relating to computer science, engineering and related fields. IEEE Xplore provides comprehensive and extensive content of journals, conferences, books etc. As such, it is a high-quality library of peer-reviewed journals, with advanced search functions focusing on the forefront of technologies. A downside of this is limited access for individuals [3].

ERIC (Education Resources Information Centre) – Another digital library, like IEEE Xplore, that provides access to peer reviewed journals as well as reports, policy papers and conference papers covering education research. Providing comprehensive coverage on its material (learning theory, education technology etc), sporting advanced search functions and access to full articles at no cost, ERIC is a powerful search tool for those in the education centre.

Using the ERIC database and using Boolean search functions of ‘Augmented Reality’ and ‘Language Learning’, a study on AR based language conducted by Okumus and Savas was identified as relevant to the research area. The study explores designing AR based language learning material from the perspective of foreign language teachers. This satisfies the chosen research philosophy by placing value in those providing use of the intended system [4].

Another two research were identified using IEEE and the search terms ‘Augmented Reality’ ‘Language Learning’ with a publication range of 2016 to 2025. Montellanos et al authored a conference paper that explored the positive impact of AR technology in language learning for the Quechua people. This a quasi-experimental design, so sample groups were chosen and cause and effect identified, recording the results [5]. The second relevant research, conducted by Scrivner and Madwell et al, discusses ongoing work on the design and process of AR and the role it plays in language learning, by measuring the effectiveness on language learners. The project aims also align

with the chosen research philosophy somewhat [6].

Task 3: Research Strategies

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There are many strategies to enhance the quality of research whether it is quantitative or qualitative:

Validity

Validity refers to how accurately an experiment or study measures whatever it intends to measure, so that conclusions made are genuine. There are two types of validity to consider internal and external. Internal validity refers to the actual design and how accurately the results can be trusted whereas external validity refers to how these results can be generalised outside the study, such as confounding/external variables and the extent that they influence the results [7]. Some ways to enhance validity in experiments is to take measure against researcher bias, such as by avoiding leading questions [7] or by integrating either a single- or double-blind collection method. Another one is to maintain study protocol, that is, follow the structure design to mitigate confounding variables [7].

Reliability

Reliability refers to how repeatable the study is, and how well other researchers can replicate the study and gain similar results, essentially it is the consistency of an experiment. There are various methods for increasing reliability. Test-retest is method to test the stability of a study over time, therefore the more retest, the higher the reliability of the study. Inter-rater reliability is another way

to enhance the reliability of the research, such as looking at the extent two researchers agree on results, in terms of software this could be having programmers use the clear coding frameworks to reduce subjectivity [8]

Reliability vs Validity in Research | Differences, Types & Examples

Generalisability

This refers to how the results of research can be applied to the world beyond the context of said research. One way to improve this is through representative sampling, which involves selecting a smaller sample size of the target population, the greater the sample size the higher the generalisability. In this context, a large sample of language learners can be used to measure the effectiveness on language learners as whole, which also applies to the next strategy. Replicating this across multiple contexts and having diverse samples can help in capturing a wider context. This may be reflected across the learning of different languages and sample age, race, gender etc [9].

Ethical Considerations

This is about participants rights and wellbeing. There have been several studies in history that are deemed unethical and have damaged and even traumatised participants (Stanford Prison Experiment). As such, observing guidelines can help keep participants and the study safe. Informed consent is one way, by ensuring that participants fully understand what the study entails and agree to it and making them aware they have the right to withdraw when they please. Protecting personal

data is also another issue to consider, especially when deal with young participants. Implementing an ethics review by an organisation's ethics committee can also ensure that the research design is ethical before proceeding with anything [10].

Action Research is a research approach that emphasises continuous improvement through iterative cycles of planning, designing, testing, and refinement. Each cycle, the researcher develops the app, getting feedback from real users, and then incorporates that feedback into the next version [11].

The data methods that can be used include user testing and observation. By observing users using the app in real time, notes can be made on engagement and ease of use. This can be implemented by screen recording and usability checklists given to the participants. This method can be combined with interviews with the group after use of the app, either individually or all together, getting more user centric feedback for the app.

Pilot Data Collection

Purpose

- Check the feasibility and usability of the product. This will include the ease in which user can download and install the app, launch and use the AR features for learning
- Check whether object recognition, translation and language feedback properly execute in a user-friendly manner

Participants

- A sample size of 8-10 learners of varying levels in target language, ages 18-22
- Properly briefed and consent to be recorded given
- Convenience Sampling method used. Through University computing/language department mailing list.
- Incentive of £5 amazon voucher or equivalent

Setting

- Environment: Conducted in university computer lab
- Smartphone devices used, same models
- Recording: Screen recording used, observers in room making notes, and camera recording hand movements and body language of participants
- Duration: 1 hour session

Measurement and Materials

- Consent form for data use and recording
- Individual data: Language level and learning goals
- Usability checklist for participants and observation checklist for observers
- Short Post task survey for feedback
- Semi structure interview, question list given to observers

Participant Task

- Install and launch app successfully
 - Use AR to identify an object, translation and audio
-
- Pronunciation practice
 - Word is used in sentence
-
- Play short version of game: Find and identify 3 objects
-
- Recall Translations

Observation Checklist

- Error handling
- Unforeseen variables
- Engagement issues
- AR stability

Interview

- Overall impression

- Usefulness of product
- Ease of use of product
- Confidence in recall
- Motivations?
- Comparison to previous learning experiences
- Feedback on use or improvements

Debrief/Ethics

- Inform data can be withdrawn within two weeks of the end of the study
- Anonymity guaranteed, no sensitive data recorded
- Data security: Encrypt data and secure storage

Timeline

- Day 1: Practice runs with colleagues
- Day 2-5: Run 5 session each day, sample split into two groups
- Day 6-10: Clean and process data and feedback on study
- Day 11-14: Summarise product processes for implementations, adjust study according to feedback data

[12]

Quantitative Analysis

This is the process of analysing data based on mathematical and statistical methods. It simplifies the study into numerical values that can be used to draw a conclusion/insight, and there are some ways to do this.

Descriptive statistics seeks to summarise the data in a meaningful way using methods such as mean, standard deviation, median etc, essentially *describing* the data/sample set. A method of this could include a data visualisation such as charts and bar graphs, displaying the data in an easy-to-

understand format. The measures of central tendency encompass the mean (average), median and mode values of a data set which gives a good summary of data values by detailing the 'centre' values. Another is the measures of dispersion, which is related to the spread of the data such as range, variance between values and standard deviation which is used in conjunction and relative to central tendency [13]

Inferential statistics are used to make predictions about a larger population based on data collected from the sample. Unlike descriptive statistics, which only summarises the data, inferential methods allow researchers to test hypotheses, estimate population parameters, and look at the relationships between variables. Some techniques include hypothesis testing such as t-tests and chi-square tests, correlation and regression analysis, confidence intervals, and probability models. For example, researchers might use data from voters to predict voting behaviours [14].

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