

Proposal

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**Mechanics of Agriculture: Exploring
the Integration of Real-World Data in
Farming Video Games and Their
Impact on Gameplay**

Research Proposal

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1: Introduction

1 Farming simulation genre has been a staple in video games for a long time, with early examples such as Harvest Moon [1] and SimFarm [2] paving the way for interactable agriculture in gaming. In recent years, the genre has seen a large spike in popularity with consumers, with a notable example, Stardew Valley [3], being one of the most successful games in this area, selling over 41 million copies across multiple platforms [4].

2 Games such as these have been shown to have positive impacts on players, such as the game Sakuna: Of Rice and Ruin [5]. Studies conducted on 428 people about the game showed that 18.5% of people who played the game showed a heightened interest in agriculture, with 10.9% of players showing an interest in a farming career after playing the game [6].

3 Games such as Farming Simulator 25 [7] have been enjoyed by players for their realism. As such, Farming Simulator has been studied by others for its potential use in the agricultural world as an educational tool. One such case study examines the potential use of Farming Simulator's precision farming DLC as a way to stimulate awareness of agricultural challenges and the use of PF as a solution [8]. In this case study, farm simulation labs were set up for participants. Out of 113 participants, 54.0% said that Farming Simulator and the farming simulation labs had helped improve their learning.

There is great potential for farming games to be used as a way to educate people on the challenges of farming and agriculture. One way this could potentially be done is via the use of data from the real world, being integrated into the game experience.

2: Background to the Proposed Research

Much research has been done in the area of video games to analyse the effectiveness of using video games as an educational tool. Matt King proposed the possibility of Sid Meier's Civilization V [9] being used as an educational tool in classrooms, with surveys conducted showing that many people had learned from history just by playing the game [10]. Another example is Thomas Bjørner and Henrik Schønau-Fog analysing how video games can be developed effectively to promote awareness of the climate crisis [11].

4

Video games have also been found to have certain benefits compared to other methods of education. Studies showed that for disaster training, a video game solution was a much more cost-effective method compared to a live simulation, costing only \$67,822 compared to \$81,313.50 for the live simulation [12].

With regards to agriculture and farming, there also been research in the realms of using video games for education. One such example is Farming Simulator has been examined for its effectiveness in agricultural education, such as in precision farming [8]. Another study in 2025 focused on how video games, specifically Farming Simulator, were influencing ideas of "good farming", described as "the rules of the game" in relation to farming [13]. This article suggests that Farming Simulator promotes a productivist view of good farming, which can both drive and prevent change in farming and agriculture. It also notes that the gameplay of Farming Simulator, and the "rules of the game", ignore certain aspects such as soil purity and conservation. It goes on to talk about mods for this game which incorporates this within the feedback loop. The article suggests that games can be a potential way to promote sustainable visions of good farming practices.



A research gap that was identified was the use of serious video games as a way to educate about agriculture, as well as how these serious games were used. Serious games have been used before as an effective way of education. In 2022, the use of Virtual and Augmented Reality to teach science education was evaluated, with results finding that whilst the serious games field had a long way to go in terms of research, there were positive developments [14]. In terms of agriculture, serious games have been used before as both a form of education and research to positive results. Gareth Enticott and Ruth Little used a serious board game to simulate cattle purchasing, which allowed them to analyse the purchasing habits of "good farmers" [15]. For serious video games, one case study showed the effect of using a serious video game alongside other methods to help improve the appropriation and adoption of a Decision Support System for bovine producers [16]. The article concluded that 34% of farmers used the DSS on their farms after 22 months. This shows that serious games can be a potentially useful tool in relation to agriculture.

However, in terms of serious video games in agriculture, there is a significant lack of research in the area. Studies in 2025 on serious games in agriculture found that out of the 182 case studies reviewed, only 29 of these were strictly video games (not counting the 27 which were strictly simulation based and 2 that were based on haptics) [17]. This even included recent publications. This article identified gaps in not only the diversity of serious games, but also certain agricultural productions. 56 of the 182 case studies focused only on crop production, with areas such as agroforestry and fish farming being heavily unrepresented in these games. This is an area that could potentially be investigated further.

Another research gap that was identified was the integration of real-world data within these games and the impact it can have on gameplay. Much of the research related to agriculture and video games always stems from the educational benefits. There have been studies in how farming simulation games can impact players, such as the research done on rice

farming simulation video games [6], there is potential for research in how game mechanics can be affected by real-world data, and how such an implementation can impact players.



3: Research Problem Statement

There is a lack of research in serious video games that focus on agriculture and farming. In addition, there is also a lack of research done into the feasibility of integrating APIs and real-world/real-time data in farming simulation games, as well as the impact such data can have on both the user experience and educating others about farming and agriculture.

4: Research Aim & Objectives



The aim of this research project is to investigate the effectiveness of integrating real-world data in farming simulation games using APIs, evaluating the potential impact it can have on the gameplay experience and player education on agriculture.

The objectives are as follows:



1. To develop a farming video game prototype in a chosen video game engine.
2. To integrate REST API services into the game, incorporating the data retrieved into the game's mechanics (e.g. weather and soil purity data).
3. To conduct testing on the API/real-world data implementation of the game alongside a simpler implementation for comparison.
4. To analyse and evaluate the potential impact of real-world data integration on the game experience and mechanics, in addition to the educational potential, using the data collected from testing.

By the end of the research project, there will be a completed game prototype that fully incorporates the use of API communication and real-world data. This practical implementation will allow us to see whether the integration of real-world data has a positive effect on the game and  be used potentially in other areas for education or to simply enhance the gameplay experience.

5: Methodology

5.1: Methods

This research project will incorporate mixed research method to analyse the effects of integrating real-world data into farming games. The main reason this method is optimal for

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this kind of project is because by analysing numerical data, such as logged data collected from the game, it simply shows what happened during gameplay sessions. Having qualitative data such as videos of game sessions and game session diary notes, can allow for a more in-depth understanding of the effects of real-world data in game mechanics. This will be a self-study done by the researcher.

The research strategy will mainly be a Software Development strategy, as the main goal of the project is to show how real-world data can be implemented into a farming simulation video game via the use of APIs.

The foundations of the farming game prototype will be created, which will include the main farming mechanics and the gameplay loop, which will be to harvest a certain number of crops and make a certain amount of money in a specified time. Once finished, a second version of the game will be made, which will have the API implementation.

Data that will be collected will include metrics from game sessions, videos of each gameplay session, and notes which will be taken during each session to detail the reasoning for certain decisions during gameplay. Data logged during each session will be evaluated using methods such as Pearson's for comparing the effect certain API data may have on the game, such as the effect temperature has on crop yield in game. The qualitative methods will use a thematic analysis approach.

5.2: Materials

The game will be built in a chosen game engine, such as Unreal Engine 5 or Unity. This will be the main way to collect the data for the research project. Multiple different API sources will be used, such as OpenMeteo [18] for location-based weather data. Other APIs can be used to gather data on soil-purity or agricultural price indexes. Data such as crop yields, money made, crops spoiled, etc., will all be logged into a .csv file, along with the data retrieved from the API services, using Unreal Engine's logging system. This data will allow us to analyse decisions the player makes in game, depending on conditions set by the real-world data.

Ethical considerations for this will include ensuring that the data obtained from these services is accurate, in addition to ensuring that the data obtained from these services is not handpicked, rather it is chosen at random, such as the location chosen to obtain the weather data from.

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Unreal Engine 5 will be used as the game engine of choice, due to its support for both the C++ programming language as well as Blueprints, a built-in visual scripting language. Another reason for the choice of engine is because of UE5’s support for plugins such as VaRest [19]. VaRest is a plugin which will allow UE5 to communicate with REST APIs and process the data obtained for use within the game.

Microsoft Excel will be used for analysis and visualization of numerical data.

A PC with a good GPU and consistent access to the internet will be required, due to the computational power that UE5 needs to smoothly function.

6: Project Plan

Below is a table showing the timeline of multiple milestones for this research project and the estimated start and complete dates for each.

Project Milestone	Estimated Start Date	Estimated Completion Date
Game Development Document for Farming Game	20/10/2025	30/10/2025
Development of Farming Game in UE5	30/10/2025	25/11/2025
Integrating API communication and data into game	25/11/2025	28/11/2025
Bug and Functionality Testing for game	28/11/2025	1/12/2025
Playing API Implementation with different parameters to gather data	01/12/2025	14/12/2025
Start of 1 st Draft for report (covering development process and data collected)	01/12/2025	05/01/2026
Analysing and evaluating data collected from play sessions	14/12/2025	15/01/2026
Changes to project/report after interim viva feedback	15/01/2026	20/03/2026
Further Testing and analysis	20/01/2026	01/03/2026
2 nd Draft of report	15/01/2026	25/03/2026
Final Report	25/03/2026	01/05/2025



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GRADEMARK REPORT

FINAL GRADE

61 /100

GENERAL COMMENTS

This project has strong potential to make a meaningful contribution to understanding real-world data integration in educational gaming. The literature engagement is solid, the proposed practical implementation is appropriate for BSc level, and the mixed-methods approach is well-suited to the research questions. With the revisions outlined above, particularly making objectives SMART and strengthening the methodology

Introduction/Aims & Objectives: 12/20

Background/Literature Review: 13/20

Project Design/Methodology: 16/30

Resources/Planning: 9/15

Document Presentation: 11/15

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PAGE 3



Comment 1

Opening paragraph is somewhat anecdotal and focuses on sales figures rather than academic framing. Consider opening with the research problem or significance.



Comment 2

Good use of specific quantitative data from peer-reviewed research



Comment 3

Good quantitative evidence cited from legitimate study. The reference to the precision farming DLC study is particularly relevant to your proposed research.



Comment 4

Literature review is primarily descriptive. Add critical analysis: Compare the educational outcomes quantitatively. How did King's findings (% learned) compare to traditional methods? What were the effect sizes? Include comparative statistics.



Comment 5

This quantitative comparison demonstrates critical analysis of practical benefits.

**Comment 6**

This paragraph summarises Daum & Foreaux (2025) but lacks critical evaluation.

**Comment 7**

Good breadth of literature including board games and video games. The 34% adoption rate statistic is particularly valuable. However, compare this quantitatively to baseline adoption rates without games to demonstrate added value.

**Comment 8**

Section 2 feedback: Too long (710 words vs 400 required), primarily descriptive rather than critical/evaluative, missing quantitative comparisons between methods, limited sustainability discussion.

**Comment 9**

Success criteria and deliverables mentioned but not explicitly defined. Add specific deliverables: (1) Working UE5 game prototype, (2) Technical documentation of API integration, (3) Dataset of gameplay metrics, (4) Analysis report with statistical comparisons, (5) Final dissertation.

Weaknesses: Objectives not SMART (no quantitative targets, timelines embedded in objectives, sample sizes, or success thresholds), success criteria undefined, deliverables not explicitly listed.

**Comment 10**

Objectives are NOT SMART - they lack measurable, quantifiable targets and specific timelines.

**Comment 11**

no comment

**Comment 12**

A consideration here :

With only one participant (yourself), findings cannot be generalised. Consider: (1) Adding n=5-10 external participants for validation, OR (2) Framing this explicitly as a technical feasibility study with pilot testing, acknowledging limitations in your discussion.



Comment 13

No development methodology?



Comment 14

Let me borrow your time machine



Comment 15

Final Report completion date shows '01/05/2025'
but should be '01/05/2026'.