University of Dublin



TRINITY COLLEGE

***Exploring the use of microworlds to teach about forest management and climate change.***

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Highlights

Abstract

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Abbreviations

* ABM = Agent Based Model (or Modelling)
* CO­2 = Carbon Dioxide
* EduTech = Education Technology

1. Introduction

Forests play a crucial role in mitigating climate change by absorbing around 30% of global emissions annually. However, they are delicate ecosystems that require protection. When a significant portion of a forest is cleared, it can shift from absorbing more carbon than it emits to the opposite, which would have disastrous implications for our planet. Unfortunately, this is already beginning to occur and will only worsen if left unaddressed.

* 1. Motivation

Balancing the demand for forest products, primarily timber, with the need to preserve forests as carbon sinks is a complex challenge that requires deep understanding of the intricate relationship between forest ecosystems and atmospheric carbon levels. Misguided forest management strategies can easily lead to over-exploitation of these precious natural resources. Therefore, ***it is essential to prioritize widespread education and awareness*** regarding sustainable forest management and conservation to ensure a bright future.

* 1. Problem Statement

Effective education demands increased user engagement. Education technology approaches involving microworlds have proven successful at achieving this in other areas but remain underutilized in the field of forest management with there being few examples of similar projects today, and none, to the best of knowledge, aimed at educating non-expert audiences about forestry and climate change.

* 1. Research Objective

This study aims to create a digital microworld that teaches adolescents about forest management and climate change through a conceptual model. Rather than focusing on scientific accuracy and intricate details, the priority is to create a simple yet realistic model that effectively captures real-world mechanisms and supports learning objectives. Agent Based Modelling (ABM) is an effective approach to simulate systems like natural forests wherein multiple separate entities or components perform individual actions that together result in complex emergent behavior. Therefore, this work utilizes ABM to develop the digital microworld.

***Research Question:*** Can a microworld, simulating forest management scenarios using Agent Based Modelling (ABM), engage users? Can such a teaching tool change the attitude of learners regarding use of forests as a nature-based solution against rapid climate change?”

1. Background
   1. Microworlds

*Different types of education technology (EduTech). Why microworlds?*

* 1. Agent Based Modelling

*How to simulate forest growth and interdependencies between them and CO­­2 levels? Explain different simulation strategies and why ABM is best for this work.*

* 1. Similar Work

*What are existing most similar works and how is this project different from them?*

1. Proposed Teaching Tool
2. Implementation
   1. Scope
   2. Methodology
   3. Limitations
3. Evaluation
4. Conclusion

*Limitations. Future work.*

Appendix

Bibliography