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Interactive dynamic learning environment (IDLE)

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Abstract
The global business community requires graduates with skills and capabilities to cope with real-world interdisciplinary problems. Two key issues frequently noted are the silo disciplinary focus and the lack of exposure to responsible decision-making (RDM). IDLE (Interactive Dynamic Learning Environment) is a web-based computer simulated enterprise delivered through a systems approach broadening students' understanding of the interrelationship between corporations, society and the environment. Engagement in IDLE develops students' understanding and application of corporate social responsibility (CSR) and sustainability through the identification of business interdependencies. In IDLE, integrating systems dynamics with agile dynamic system development methods enabled the intricate multifaceted relationships of organisational decision- making that includes CSR and sustainability interrelationships to be explored. The resulting unique design ensures real organisation decision-making dynamics, while not being so complex that the interrelationships were overlooked during student engagement.

Keywords
environment, learning, dynamic, idle, interactive

Disciplines
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Interactive Dynamic Learning Environment (IDLE)

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Abstract. The global business community requires graduates with skills and capabilities to cope with real-world interdisciplinary problems. Two key issues frequently noted are the silo disciplinary focus and the lack of exposure to responsible decision-making (RDM). IDLE (Interactive Dynamic Learning Environment) is a web-based computer simulated enterprise delivered through a systems approach broadening students' understanding of the interrelationship between corporations, society and the environment. Engagement in IDLE develops students' understanding and application of corporate social responsibility (CSR) and sustainability through the identification of business interdependencies. In IDLE, integrating systems dynamics with agile dynamic system development methods enabled the intricate multifaceted relationships of organisational decision-making that includes CSR and sustainability interrelationships to be explored. The resulting unique design ensures real organisation decision-making dynamics, while not being so complex that the interrelationships were overlooked during student engagement.

Keywords: Responsible decision-making · systems dynamics methodology · dynamics systems development methodology · simulation · business higher education

1 Introduction

Academic and practitioner literature express serious concerns about the current approach to business higher education in developing an understanding of organisation interdependencies and responsible decision-making attributes. Understanding and being able to consider these interrelationships in decision-making is significant in order to cultivate holistic thinking business graduates. Unfortunately many current teaching approaches to business higher education are strictly discipline-based and fail to develop and organise knowledge in a way that is useful to practicing managers [1]. IDLE provides a technologically-rich simulated learning environment where students experience the intricacies and interactions of business decisions, the environment and society within an organisational framework.

IDLE is experienced by over 1500 business higher education students annually and has been adopted by a number of tertiary and secondary education programs. Designed around the manufacturing industry, multidisciplinary teams of business students compete across a performance matrix which includes profit, environmental impact, sustainability, social innovation and quality of service. Students describe the simulated learning environment in a positive way; "I think the best thing about the simulation is that it reflects the nature of the 21st century business world. The interactive dynamic learning environment reflects the complexity of modern business from

which I now have a better understanding of company operations. I can apply theory to practice through the simulation" (Student Reflection 2011).

2 Design

2.1 Goals

The goal of IDLE is to develop responsible decision-making skills in future leaders by anchoring corporate social responsibility and sustainability decision-making in the strategy and activities that arise during the running of a web-based computer simulated enterprise (IDLE) within facilitated laboratory curricula. Integrating knowledge across disciplines, this innovative approach aims to broaden students' understanding of the interrelationship between corporations, society and the environment with multidisciplinary teams running an online simulated manufacturing enterprise for a period of several weeks. The students work at their own pace during a laboratory session, discussing ideas amongst one another, trying a range of decision-making options, evaluating consequences, seeking mentor assistance when required and enjoying learner-learner collaboration. Inbuilt videos and comprehensive scenarios designed around an evolution of timed events, from the present to four years into the future allows business students engaging in the simulation to achieve a more realistic feel for the organisation they are managing. These information and communication technological resources ensure the student's learning environment is practice-based and hands-on.

2.2 Scenarios

The dynamic relationships built into the design of IDLE allow the interdependencies that exist in responsible decision-making to be experienced by those engaging in the simulation. The scenarios deliver the model in a way that provides a realistic feel for the simulated manufacturing organisation they are managing.

To achieve the outcomes, the scenarios chosen during the design stage had to allow for the uncertainties that underlie the different decision-making areas to be experienced while considering various options and possibilities.

The scenarios were designed and developed around the topic area of the United Nations Global Compact [2] principles of human rights, labour standards, environment and anti-corruption. Designing and developing the scenarios around the UN Global Compact [2] principles allowed the simulation to demonstrate complex societal forces at work within an organisation. An example of this is under the environment topic area. Figure 1.0 visually represents the e-waste management decision areas in IDLE. Students are required to evaluate the cost of implementing a waste management strategy for their business versus possible penalties and non-efficiencies for noncompliance and adverse publicity.

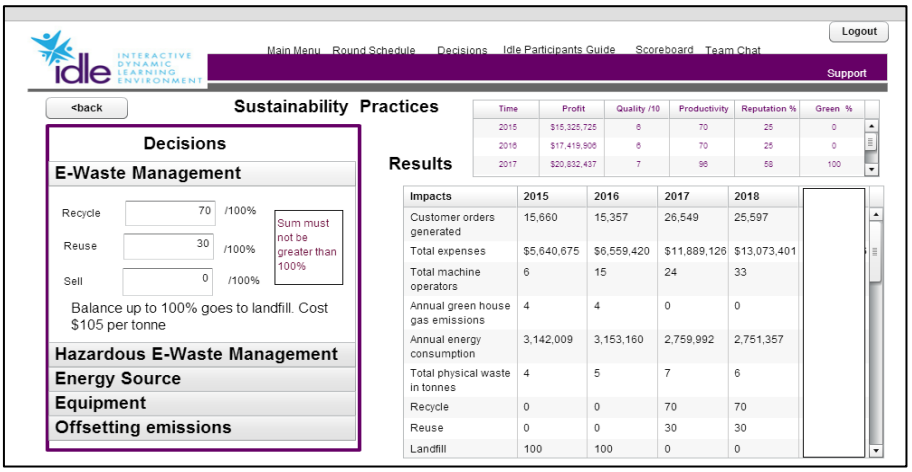

Fig. 1. e-Waste management decision screen

2.3 Users

IDLE is predominately engaged by business higher education students at UOW Australia, Singapore and Malaysia. It has been piloted for use at the University of Western Australia and Monash University, Melbourne. IDLE has also been engaged by high school students, post-graduate students and industry personnel during verification and validation.

2.4 Design process

Designing and constructing IDLE required a fusion between simplicity and elaboration. The key objective was to develop a simulation based on a simplified abstraction of a system that retained the key elements of organisation dynamics without unduly complicating the learning environment. In order to identify and portray these dynamics, Systems Dynamics methodology [3] was integrated with an agile Dynamic Systems Development method [4]. Integrating the methods enabled:

- The exploration of the intricate multifaceted relationships of organisational decision-making that includes CSR and sustainability interrelationships;
- The creation of dynamic models that represent the behaviour of the interrelationships overtime;
- Verification and validation of the dynamic models by students and industry representatives;
- The creation of a web-based user interface to allow scenario interaction during decision-making to be accessed by a large number of students; and
- The evaluation of a web-based computer simulation in business higher education.

3 Evaluation of the artefact

3.1 Lab study

Quantifiable data were gathered during student engagement with IDLE in order to try to measure attitudinal change to responsible decision-making through a systems approach to business higher education. A pre- and post-test design was administered in order to measure a change in attitude when engaging with the web-based simulation [5]. Business students were given a Likert scale pre-test prior to engaging in the simulation and again five weeks later after simulation engagement for the post-test. This enabled the same student's attitude to be measured before and after the simulation engagement. Overall, the post-test reveals a change of attitudes for business students engaged in a systems approach than in the pre-test. This is evident when direct decision-making occurred in the simulation. Exploratory analysis revealed interesting results for future research surrounding gender and ethnicity.

Qualitative data was also gathered during student engagement with IDLE. Observations revealed learning through systems simulation to be engaging, thought provoking, challenging, stimulating and enjoyable. To support the quantitative and observation findings, qualitative business student reflections after the web-based simulation engagement were also collected and analysed. Key themes were collated into three overarching concepts which together characterised the positive evaluation: First a unique learning experience, second an interdisciplinary learning environment and finally a collaborative engagement. Experience, environment and engagement combined to an overarching theme that resulted from providing a systems approach to learning.

4 Significance to research

The study findings have theoretical implications for simulation design and development. These include:

- Simulation design – Multiple Identification Theory (MIT) [6] conclude that simulations can foster attitudinal change by adopting affective, cognitive and behavioural identification design dimensions. This research supports MIT simulation principles but also reveals the importance of the experience, the learning environment and direct simulation engagement when designing a simulation for attitudinal change.
- Simulation development – Integrating Systems Dynamic methodology with an agile Dynamic Systems Development method revealed the interdependencies between system dynamics (SD) [3] and agile software development activities [4]. The construction of IDLE required the understanding of nonlinear behaviours that occur between a business, the environment and society. System dynamics provided a method for framing and understanding these complex dynamic interrelationships. IDLE development also required a user-interface for application in the classroom. Agile software development processes allowed the dynamic models to evolve through early delivery and continuous improvement into a software product for use

in business higher education. This study supports further research integrating SD into the software development cycle.

5 Significance to practice

Applying a systems approach to responsible decision making in undergraduate business education has many potential implications to practice. These include:

- Enhancing curriculum design — the availability of a unique web-based systems simulation model provides an experiential learning experience that can be integrated into existing or new curriculum. This engaging learning approach can be used to improve curriculum design in undergraduate business education
- Systems approach application — the dynamic model that underlies the calculations and interdependencies in IDLE can be used as the basis for understanding complex responsible decision-making interrelationships in other sectors such as service, mining, transportation, agriculture and government. The implications of this are significant in ensuring responsible decision making is applied on a global scale.

6 Link to implementation

Please refer to associated video 'Products & Prototypes Submission IDLE', https://youtu.be/pNNDZcln6Ug.

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