Simulation Games: Shifting from Conceptual Learning to Experiential Learning

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Abstract

Numerous views exist concerning the effectiveness (or ineffectiveness) of incorporating simulation games into learning environments. The shift from Conceptual Learning (or Learning by 'listening') to Experiential Learning (or Learning by 'doing') is gaining in popularity. Kolb's (1984) Experiential Learning Cycle framework is used as the platform to infuse the 'Climate' element outlined in Schwab's (1973) 'Elements of Educational Experience' to illustrate the importance of a blended learning experience. An anecdotal case study is presented based on experiences of using simulation games in a module taught at the University of Hertfordshire, UK in order to gauge the teaching and learning experiences and benefits. Teaching staff initially expressed mixed feelings regarding the teaching and learning outcomes from using simulation games. However when the outcomes were compared with Bloom's taxonomy of Educational Objectives these were found to have met all levels of the objectives.

Introduction

In 1973, Schwab outlined four main elements of educational experience. For many years, learning has been uni-directional; Shank (1997) called it the learning by 'listening' method. As learning experience progressed over the years, various authors have introduced different frameworks to enhance the student learning experience, such as Kolb's Experiential Learning Cycle in 1984.

This paper focuses on Schwab's forth element, 'climate'. Detailed discussion will be presented on how this element can be modified to achieve a more experiential learning experience for learners (students). Kolb's (1984) Experiential Learning Cycle is used both as the platform for understanding the stages of learning experiences and to demonstrate how the 'climate' element from Schwab's work can be incorporated into Kolb's learning cycle to propel a learner's experience from conceptualisation to experiential.

Web-based simulation games form the primary focus of this paper and are demonstrated as a potential method to trigger the shift in the experiential learning cycle. Comments from various authors and users of simulation games are presented to support the benefits derived from combining this 'new' method with traditional learning methods. Anecdotal experiences from the author and his colleague, Mr. David Ogle, are also presented.

The concluding information in this paper will show how simulation games have affected the teaching and learning experience, and how the process of a simulation game which was incorporated in a module called Marketing Challenge in the University of Hertford-

shire (UH), has managed to achieve all levels of cognitive learning outlined in Bloom's Taxonomy of Educational Objectives.

Learning Approaches

Schwab (1973) outlined the four main elements in an educational experience as (1) Teacher, (2) Student, (3) Curriculum, and (4) Climate. Teachers lead this experience by setting the educational agenda and develop the knowledge which is then presented to the students. Students are receivers of this experience, and are in control of their participation and acquisition of knowledge transferred. The curriculum is defined as the knowledge, skills, and values transferred between teachers and students; and *vice-versa*. The educational climate is the final element which completes this experience, where students and teachers define, interpret, and apply the curriculum (Bloom 1968).

Discussions within the teaching and learning community have taken place concerning two distinctly different learning approaches, which Shank (1997) has called, Learning by 'listening' (or Conceptual Learning) and Learning by 'doing' (or Experiential Learning). The first method, 'listening', has been practiced since the Medieval Ages, also known as the 'Master Lesson', where the educational experience is predominately one-way and teacher-centered. At the other end of the spectrum is the 'doing' method where both teachers and students use alternative learning approaches, among which are practical assignments, internships, case studies, and simulation games which use experience as an essential element to achieving learning objectives.

Traditional methods of teaching and learning all have their strengths and limitations. Various authors recognise that traditional teaching methods (lecture, textbook and case study) may not be able to fully develop important higher order learning skills.

Lecture/Textbook

Under this format, students are usually 'passive learners'. This format is efficient for communicating a large number of concepts to a large number of students, but it is doubtful that their decision making, creativity, integration of cross functional materials, problem solving, decision making, risk-taking, or interpersonal skills are improved by only listening to lectures (Thorne et al., 1999; Cadotte, 1995).

Case Study

For many years, case studies have been the measuring stick, and provided for many, the cornerstone of management education. Although they measure the integration of theories with applied business examples that provide the context in which students can gain in-depth knowledge, case studies do have limitations, as students are not able to see the consequences of their decisions and test alternative proposals (Thorne et al., 1999; Cadotte, 1995).

Evolution of the educational experience

O'Hara (2007) proposes that pedagogy will have to shift from knowledge to learning, as not only what we learn but how we learn it will need to change. The suggestion is that interactive pedagogies must be introduced into the learning contexts, which are reflective not only with respect to particular content and individual self development, but also with regards to group dynamics and human relations. Education should become inquiry focused, problem embracing and case based with knowledge and learning derived from attempts to solve problems. This problem-based learning approach supports Chickering and Gamson's (1987) seven principles of good practice, where active learning is encouraged.

Progressing from the medieval age to the digital age, the educational experience has also evolved. Teachers are increasingly expected to push the educational experience to a higher and more practical level for both themselves and their students. Teachers frequently incorporate project-based learning, acknowledging the superior understanding students gain when they apply principles in practice. This belief is evidenced when Wiggins (1993, p.229) described authentic assessments as "…engaging and worthy problems or questions of importance, in which students must use the knowledge presented to fashion performances effectively and creatively. These tasks are either replicas of or analogous to the kinds of problems faced by adult citizens and consumers or professionals in the field." Mueller (2008) also supports the 'doing' method, saying that "when learning opportunities are infused with authenticity, students are immersed in real-life activities with the opportunity to apply, analyse, synthesise, and evaluate concepts."

Due to the fact that outcomes and assessments in real-life situations vary over time, teachers are able to adapt their delivery methods to individual needs and respond as students apply their acquired knowledge. Karet and Hubbell (2003) note that simulating real-life learning environments enhances several skills for students, particularly those noted by The CEO Forum as 21st Century Skills. These skills include digital-age literacy, inventive thinking, effective communication, and high productivity skills, defined as follows:

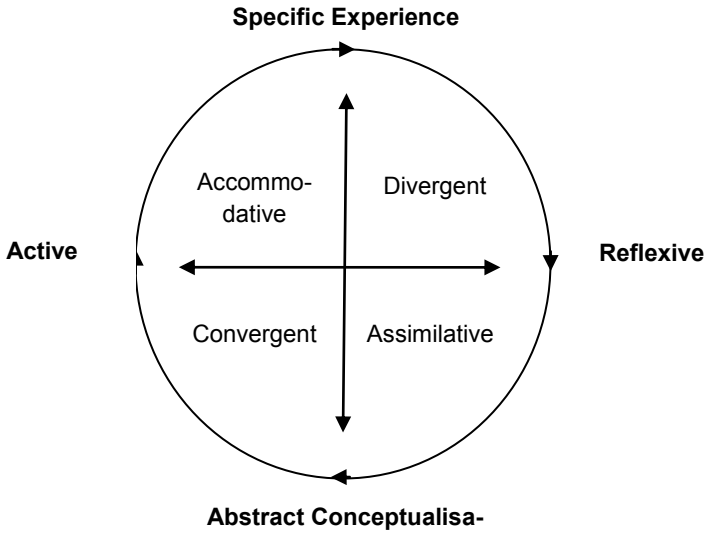
- Digital-age literacy: incorporating competence in information technology to enhance the traditional instructional strategies.
- Inventive thinking: addressing the need for a workforce that is capable of managing complex tasks, adapting to uncertain situations, and illustrating higher order of thinking and sound reasoning.
- Effective communication: including the need for students to collaborate in team environments and having strong sense of personal, social, and civic responsibilities.
- High productivity: demonstrating the skills to prioritise, plan, and manage to achieve the forecasted results.

These skills compare well to Kolb's Theory of Experiential Learning (1984), where high-

lighting experience is seen as the main element of the learning process. It can be concluded that learning is an ongoing process derived from experience which requires the resolution of conflicts among dialectical positions. In addition, it is also a holistic process of adaptation to real-life situations, which include exchanges between people and the environment. The main function of the learning process is the creation of knowledge.

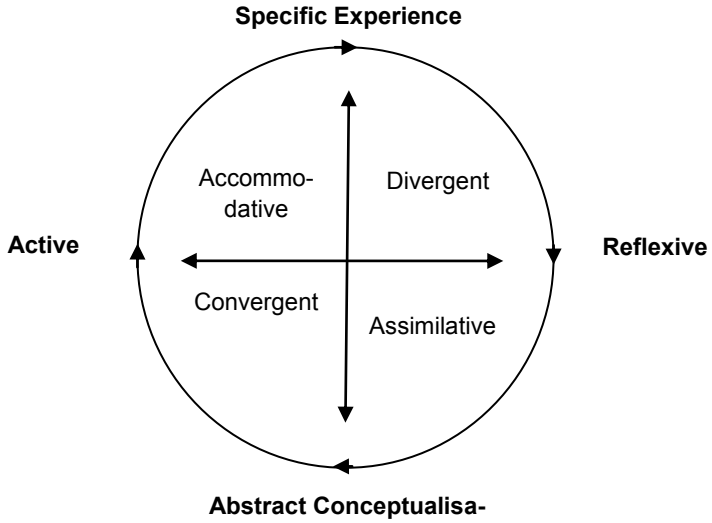
Kolb (1984) illustrates the experiential learning cycle to reflect the holistic stages involved; Specific Experience, Reflexive Observation, Abstract Conceptualisation, and Active Experimentation (see Figure 1). In this cycle, the objective is for students (learners) to reach the final stage of Active Experimentation. In order to achieve this, the main catalyst is 'convergence of knowledge' to propel the students forward from Abstract Conceptualisation. To convert the knowledge from an abstract form of learning to an active form of learning, the 'climate' mentioned by Schwab (1973) in the discussion above is the key element which could support or stagnate this transformation. Figure 2 illustrates Kolb's Experiential Learning Cycle where the 'Convergence of Knowledge' can be equated to 'climate' from Schwab's (1973) Four Elements of Educational Experiences.

Figure 1 - The Experiential Learning Cycle.



Source: Kolb (1984)

Figure 2 - The Experiential Learning Cycle incorporating 'Climate' element.



Source: Kolb (1984) and Schwab (1973)

Adapting the Alternative Climate of Delivery to Simulation Games

On the basis of the experiential learning cycle, simulation games can be used as a method of alternative climate of delivery. Kolb (1984) describes simulation games as "an appropriate method to facilitate experiential learning." There are many different terminologies used to describe these web-based interactive games. Terms include simulators, business simulators, simulation games, macro-world/micro-world and learning laboratories. Gilgeous and D'Cruz (1996) explain that due to the connotations of each word, there is a high possibility of confusion as to what these games really are, and why they are called 'games'. This confusion has led many people to avoid using simulation games because they are unaware of their full scope, potential, and benefits. It is therefore, important to define them in a realistic way.

Briefly, from a user's point-of-view, simulation games are computer-based or web-based interactive games that are based on a simulation of a real-life situation, where participants role-play, make decisions, and receive feedback on the results of their actions, upon which, they have the opportunity to reflect on their previous decisions, and further improve their future decisions.

By definition, simulation games are used for training purposes and enable trainees to put theory into practice in a risk-free, less expensive environment. Simulation games are used to increase business awareness and develop management skills such as decision making, problem solving, and team working. An element of competition between individuals or teams of players is normally involved. Formats used include board games and computer-based simulations of the running of a business (BNET Business Dictionary, UK).

Thavikulwat (2009) explains that "a simulation is an exercise involving reality of function in an artificial environment, a case study but with the participants inside." From the pedagogical perspective, Akilli (2007) refers to simulation games as "experiential exercises in which there is 'learning how to learn' that provides something more than 'plain thinking'. It's beyond thinking."

The practice and experience of Simulation Games at the University of Hertfordshire, UK.

At the University of Hertfordshire (UH), the first year, second semester Business students are exposed to a module aptly named 'Marketing Challenge'. This module is taught using a blend of traditional face-to-face methods and web-based technology methods, namely, SIMbrand, a simulation game software developed in Helsinki, Finland. SIMbrand is incorporated into traditional lectures to aid the development of student understanding of business decision-making as a whole, with particular emphasis on profitability (see figure 3).

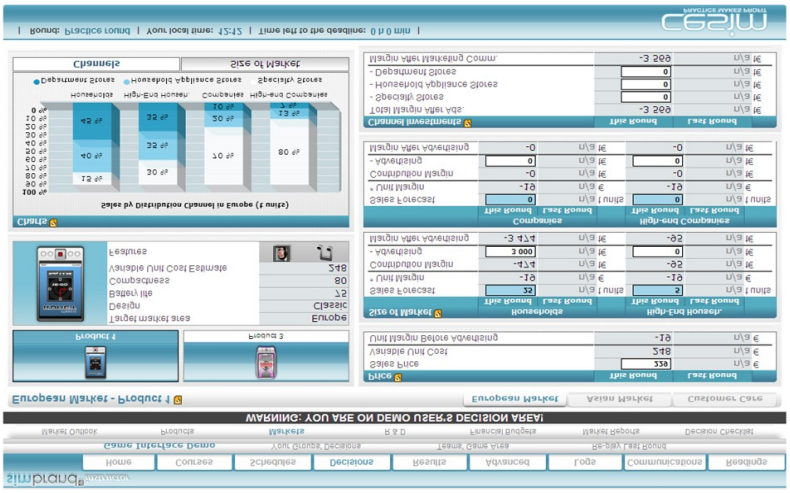
In this module, students are required to work in teams of three in a virtual company which manufactures and markets PDA (Personal Digital Assistant) phones. In the span of eight weeks, each team must strategise and implement their decisions after consulting the weekly varied market situations presented by SIMbrand. These market situations mimic actual scenarios that may be presented to a real-life company. These include among others, target market profiles; current and future trends of markets; rising costs for promotional activities such as advertising and public relations; fluctuation of resources such as quantity of raw materials and labour costs.

Based on these changing market situations, students are required to manufacture PDA phones to be marketed globally for a profit. The SIMbrand simulation game allows students the flexibility to develop their own PDA phones by adding or deleting features on the phones, the size and weight, and the exterior aesthetics. This flexibility to develop the PDA phones, however, comes with a cost which is then transferred into the price of their newly developed PDA phones.

Once the PDA phones are created, the next step is to analyse the other sector of the market, namely the target market profile. Each market and target audience varies in their expectations. For example, the target audience in Japan has a different profile when compared to the target audience in India or the UK. Therefore, students need to brainstorm amongst themselves to decide which PDA phone will suit each market and audience. Once this decision is made, the next step is to determine the future trends of these markets. Similar to case studies, web-based simulation games are designed to cover various aspects of a business context such as allocation of expenses for advertising, human resources, research and development and so on. Students need to complete the whole process from analysing target audience profiles, to forecasting the future trends of the targeted market, before any promotional activity can be planned. This

decision is made more dynamic by having the students calculate the cost of their promotional activities, coupled with the rising (or lowering) of resources available in that given week. To top it off, each team in this module is in competition with another team. The weekly duration of this simulation game is equated to an annual decision making period in a real-life situation.

Figure 3. An example screenshot from SIMbrand



The 'fun' factor is the intrinsic motivation which challenges students to learn and improve at each level of the simulation game. Malone & Lepper (1987) suggest that there are four basic factors needed for intrinsic motivation to occur during a learning activity, namely, challenge, curiosity, control and fantasy. These four factors make up the 'fun' factor of any simulation game.

Advantages and Disadvantages of Simulation Games

There is no statistical data for this module and associated simulation games *per se*, to support whether the student experiential learning process is enhanced when the 'climate' element is altered from the traditional 'listening' method to the 'doing' method. However, research from Kolb (1984) on Simulation games vs. other learning methods (where simulation games are compared with other popular learning methods e.g. the magisterial lesson and case study methods), showed that each of the teaching methods effectively produced one or several of the four stages in the Experiential Learning Cycle, with Specific Experience being the initial stage, followed by Reflexive Observation and Abstract Conceptualisation, with Active Experimentation being the most desired point. According to this research, the learning outcomes from the magisterial lesson method are geared towards Reflexive Observation and Abstract Conceptualisation stages, while case study and simulation game methods reproduce emotional, perceptual, and symbolically complex environments, which are geared mainly towards Specific Experience, Reflexive Observation, and the final stage of Active Experimentation. Thus, this suggests that simulation games have the potential to improve the student learning experi-

ence and knowledge acquisition. In addition, anecdotal observations from using simulation games at the University of Hertfordshire suggest that student attendance, participation, enthusiasm, and a healthy competitive spirit are all enhanced in the Marketing Challenge module at UH. David Ogle, colleague and Module Leader of the module, comments that "…the game is an excellent tool for teaching the students the elements of real live business activity, particularly in relation to financial decisions and decisions based on issues they have studied in their general marketing lectures."

Gilgeous and D'Cruz (1996) support the incorporation of simulation games into lectures by explaining that the introduction of simulation games into current teaching methods provides a teaching tool to contextualize what is learned with lecture and case studies applying knowledge into real problems through 'learning by doing' and enhancing understanding of cause and consequences. By complementing lectures with simulation games, information from lectures can be used in games to deepen student understanding, as numerous concepts can be dealt with in one game. Students can learn about the quality of their decisions directly and see how decisions can result in constraints on future decisions.

Many authors assert that using web-based simulation games to complement traditional teaching methods has the potential to enhance learning, attitudes, and behaviours. These findings, however, are on the merits of perceptions of learning as reported by the participants (students and players) and the instructors (teachers and facilitators), and may not be objective assessments. They measure affective, not cognitive learning behavior such as Motivation; Problem solving; Transfer of knowledge; Decision making and cross functional skills; Increased retention of knowledge; Adaptive knowledge; and Behavioural attitudinal and knowledge change.

Table 1 - Affective Learning Behaviours from various authors collected from participants and instructors of simulation games.

Motivation   Stimulate the enjoyment, motivation and engagement in experiencing and learning from close to real situations, otherwise too costly, difficult or impractical to implement. Increase students' motivation, and the ability to explore, experiment and collaborate by testing hypothesis and investigating 'what if' scenario. – Source: Fripp (1993)
Problem Solving   As simulations can be designed to replicate dynamic actual market situation, they help students to understand and experience the management concepts and the inter-relations among the various functions of business. – Source: Cadotte (1995)   They address the lack of opportunities to learn real problem solving skills by actively involving students in the decision making process of business issues. – Source: Doyle and Brown (2000)
Transfer of Knowledge   Enable student to transfer the knowledge learned into real business situations, as simulations provide opportunities for practicing business skills in a realistic risk-free learning environment. Source: Senge (1995)
Decision making and cross functional skills   Learn and improve management capacity in the business functional areas. Learn and improve their strategic management capacity, improve their teamwork and leadership skills, and improve the quality of the corporate decisions they make. Source: Toki (2000)
Increase Retention of Knowledge   Simulation games provide active learning that involves the learning by being engaged in the instructional process by exploring, analyzing, communicating, creating, reflecting, or using new information or experiences. Source: Cadotte (1995)
Adaptable Learning   Accelerate learning ability to and encourage faster learner comprehension of complex skills than other learning methods allow. Source: Senge (1995)
Behavioural, Attitudinal, and Knowledge Change   Actively engage in situations where they must act and observe the consequences of their actions. And since everyone shares the same experiences, learning occurs through dialogues among participants who share observations, feelings and thoughts and arrive together at conclusions about what has been learned. Source: Kolb et al. (1984)

Source: Various as cited in Table 1.

Table 2 - Effectiveness of Simulation games in Marketing Challenge module against Bloom's Old and New Taxonomy of Educational Objectives. Sources: Bloom (1956), Overbaugh, R. And Schultz, L. (2008), and Author's anecdotal experience (2009).

Old Bloom's Taxonomy	New Bloom's Taxonomy	Simulation Games in Marketing Challenge module
Knowledge Terminology and previously learned information.	***Remembering*** Can students recall or remember the information?	***Knowledge Recall*** Information gained from lectures will trigger the relevance of each decision.
Comprehension Grasping the information, discuss and make sense out of it.	***Understanding*** Can students explain ideas and concepts?	***Conception*** Students with differing levels of knowledge and ideas need to brainstorm to a consensus.
Application Turning information into new and concrete situations to solve problems.	***Applying*** Can students use information in a new way?	***Relevance*** Once a consensus is agreed, it needs to fit with the weekly differing market situations which reflect real life scenarios.
Analysis Breaking down informational materials into their component parts.	***Analysing*** Can students distinguish between the different parts?	***Validity of Investigation*** Different market situations tap on different sections of a business setting, such as profit and loss, advertising costs, market trends, target audience's preference, etc.
Synthesis Applying prior knowledge and skills to produce a new or original whole.	***Evaluation*** Can students justify a stand or decision?	***Assessment*** Once a decision is made and sent. Results with feedback will be tabulated and reverted. Students need to reassess the previous decisions and decide on the next decision for further improvement.
Evaluation Decide, evaluate and support the result of the end product.	***Creating*** Can students create new product or point of view?	***Reflection*** A reflective report is required at the end of this module to judge the value of their decisions.

Based on Bloom's (1956) categories in the taxonomy of Educational Objectives, where six cognitive domains were defined to represent the level of knowledge and understanding of a learner, a comparison has been made to reflect the 'Old and New' Bloom's taxonomy against the incorporation of the simulation game in the module, Marketing Challenge (Table 2). It is evident that by completing simulation games, the level of knowledge and understanding spreads across all levels of Bloom's Taxonomy of Educational Objectives.

Like any system, there will be glitches however, as highlighted in the following comments from David Ogle (Module Leader) and Nasserkhan Jamalkhan, (Co-tutor of the Marketing Challenge module):

"…the game presupposed a basic level of understanding of non-marketing aspects of a business such as financial statement…a lot of time was spent in explaining the financial and accounting issues." – David Ogle (2010).

"…did not offer the flexibility to customize the scenario and parameters to suit the module and its level of assessments…students may not have the level of understanding of certain aspects of business, thus, having to work on trials and errors." – Nasserkhan Jamalkhan (2010).

Conclusion

The above discussions have summarised a variety of views concerning the used of web -based interactive games in teaching. There is no one perfect learning method; teaching and learning is and should always be flexible and relevant to both the teachers and learners. Most importantly, it should be up-to-date, regardless of the mode of delivery.

Simulation games existed in the mid 1950s, and the use of this 'new' learning method has been growing ever since (Baker, 1994). As Kolb's (1984) cycle of experiential learning illustrates, it is essential to modify the method of learning in order to achieve the optimum experiential learning by moving from Abstract Conceptualisation to Active Experimentation. In order to achieve this, Schwab (1973) suggests that to convert knowledge from conceptual to active experience, the 'climate' element needs to be modified to trigger this shift between learning method and environment. Simulation games have been avoided as a method of learning by some, due to confusion caused by terminology that may not adequately reflect the benefits of these tools. However, once the confusion of terminology is cleared, many authors have found the application of simulation games to have a positive educational benefit.

Despite the various merits and drawbacks of incorporating simulation games within a Business module at the University of Hertfordshire, overall the Marketing Challenge module (within which simulation games have been used) has achieved all cognitive domains in the learning levels of Bloom's Taxonomy of Educational Objectives (1956). In

addition, student attendance, participation and enthusiasm surpass that shown when only traditional learning methods were used on this module.

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