***The educational value of using simulation games in the classroom: learners' perspective (0572)***

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## Introduction

One of the challenges facing management education (ME) is to develop students' critical thinking skills and enable students to link theory to practice (Lovelace et al., 2016). Business schools have been criticised for not adequately preparing graduates for the working environment (Pfeffer & Fong, 2002) and there is increasing concern about the way business strategy courses are taught (Greiner et al., 2003). Strategy courses have been criticised as being mainly theory based and overwhelming students with analytical tools that might lack relevance in today's ever-changing environment (Bower, 2008).

Building on experiential learning (EL) theory, game-based learning literature argues that simulation games (SG) create a realistic representation of the professional environment students might encounter (Salas et al., 2009). Consequently, SG provide students with valuable professional skills needed in today's workplace such as data analysis, strategic planning, decision making, problem solving and teamwork (Salas et al., 2009). EL has become an important approach in ME because of its premise that knowledge is created through the interface of theory and practice (Lovelace et al., 2016).

The fundamental value of SG in ME has been well established as they offer a safe, inexpensive and effective way of learning and enhance students' engagement (Lovelace et al., 2016). Despite the acknowledged importance of simulation-based learning, empirical studies that examine the usefulness of SG as a teaching tool in ME remain limited (Salas et al., 2009). Moreover, most of the existing literature in the evaluation of SG is largely descriptive (Leemkuil & De Jong, 2012). Therefore, to advance this literature, it is paramount to evaluate the educational value of using SG from the learners' perspectives (Leemkuil & De Jong, 2012).

This research contributes to the literature on the effectiveness of SG in enhancing students' ME.

## Literature Review and Hypotheses

Experiential learning theory argues that learning is a process by which knowledge is created through the transformation of experience, which, in turn, is accomplished through the recognition and response to environmental and personal demands (Kolb & Kolb, 2009). EL emerges when a participant cognitively, affectively, and behaviourally processes knowledge, skills, and/or attitudes in a learning situation characterised by a high level of active involvement (Kolb & Kolb, 2009).

Research suggests that SG offer pedagogical benefits including cognitive, affective, and kinaesthetic engagement (Lovelace et al., 2016; Ranchhod et al., 2014). Studies on students' perceptions of learning in business simulated environments suggest that students value simulations and view them more positively than both lectures and case discussions (Lovelace et al., 2016).

Learning is a major factor that might result from good simulation performance (Wellington & Faria, 1996). Strategy-based SG usually target students' analytical skills in making strategic decisions (Lovelace et al., 2016). Students can relate the concepts learned during the instructional part of the module to their strategic decisions in the game (Ranchhod et al., 2014). SG can provide a solid basis for learning as they help to increase comprehension of the complexity of organizations (Zantow et al., 2005; Lovelace et al., 2016).

A major benefit of using SG is their potential in developing students' skills which is the primary objective of ME (Salas et al., 2009). Game-based learning literature argues that because SG create a realistic representation of the environment, students develop valuable skills such as data analysis, strategic planning, decision making, problem solving and teamwork (Ranchhod et al., 2014; Salas et al., 2009). SG are effective tools in ME because they allow for the development of management skills at a faster pace ( Salas et al., 2009)

Affective evaluation refers to the positive outcomes related to motivation, engagement and overall satisfaction of the simulation game experience (Ranchhod et al., 2014). SG offer great opportunities for students to learn and experience real-world issues, which induce actionable knowledge (Blood, 2006). Participating in the simulation requires students to work in teams which also encourages cooperative learning and enhances students' engagement and motivation (Kolb & Kolb, 2005).

**Research Methodology**

The study used survey and qualitative data from students' reflective reports from a sample of 120 students collected in three consecutive years for the same course. The SG adopted for this module was the GLO-BUS SG developed by GLO-BUS Software. In GLO-BUS, students are distributed into groups where 4-6 students are assigned to run a digital camera company. For the quantitative research method, a questionnaire was distributed to students during the final lectures. Items were adopted from scales developed by Ranchhod et al. (2014) to measure experience generation, conceptual understanding, skills development, and affective evaluation respectively (Appendix 1: Hypotheses).

## Findings

Exploratory factor analysis and reliability analysis were performed to assess the constructs' measurement. Reliability is estimated via internal consistency and Cronbach's alpha, and validity is estimated with factor analysis and inter-correlation between constructs (Churchill, 1979). Item factor loadings, means, standard deviations along with reliability and AVE scores for each construct are reported in **Table 1**. Results support hypotheses 1,2&3 (**Table 2**): SG generated experience has a positive impact on conceptual understanding, skills development and affective evaluation. No full mediation effect was found (**Table 3**), hence rejecting hypotheses 4&5. **Figure 1** presents the study's conceptual model and findings.

**Table 4** highlights the themes emerged from students' reflective reports along with representative quotations, confirming the value generation model identified in the quantitative research.

## Conclusion

This research empirically validated four types of educational value generated by the GLO-BUS simulation game: experience learning, conceptual understanding, professional skills development, and affective evaluation. Our study supports the argument that strategy-based games are effective tools for developing students' conceptual understanding (Lovelace et al., 2016).

The study contributes to the literature on game-based learning and EL through the empirical evaluation of the educational value of using SG from the students' perspective. The underlying premise of this study is consistent with the view that EL has a positive impact on students' engagement and learning. Adopting the simulation game proved to be very effective from both the students' and the researchers' perspective. Finally, it is hoped that this research inspires more management educators to consider adopting SG to enhance students' learning experiences.

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**Appendices:**

**Hypotheses:**

Hypothesis 1: The experience generation in the simulation game has a positive impact on students' conceptual understanding.

Hypothesis 2: The experience generation in the simulation game has a positive impact on students' skills development.

Hypothesis 3: The experience generation in the simulation game has a positive impact on students' affective evaluation of their learning experience.

Hypothesis 3: The experience generation in the simulation game has a positive impact on students' affective evaluation of their learning experience.

Hypothesis 4: Conceptual understanding mediates the relationships between experience generation and affective evaluation.

Hypothesis 5: Skills development mediates the relationships between experience generation and affective evaluation.

## TABLE 1: Constructs' Measurement

| Factors | Items | FL | Mean | SD |
|---|---|---|---|---|
| **Experience generation** (α=0.73; AVE=0.66) | Glo-Bus gave me the opportunity to: | | | |
| | take risks I could not take in a real business | .767 | 4.1 | 0.7 |
| | experiment with different business ideas | .806 | 4.4 | 0.6 |
| | have strategic perspective | .868 | 4.4 | 0.6 |
| **Conceptual Understanding** (α=0.88; AVE=0.60) | Playing Glo-Bus enabled me to better understand: | | | |
| | product designing strategy | .810 | 4.0 | 0.5 |
| | pricing strategy | .765 | 4.3 | 0.6 |
| | distribution strategy | .791 | 4.0 | 0.6 |
| | advertising and promotion strategy | .869 | 4.1 | 0.7 |
| | human resource management | .710 | 3.7 | 0.8 |
| | financial performance | .769 | 4.0 | 0.7 |
| | international marketing strategy | .697 | 4.2 | 0.7 |
| **Skills Development** (α=0.87; AVE=0.48) | Glo-Bus enabled me to: | | | |
| | feel working in a realistic environment | .764 | 3.8 | 0.9 |
| | evaluate the success of particular strategies that were adopted | .763 | 4.0 | 0.7 |
| | learn issues that they would not normally have picked up in a class situation | .775 | 4.1 | 0.7 |
| | recognise the difference between tactics and strategies | .687 | 4.0 | 0.8 |
| | analyse information more effectively | .527 | 4.0 | 0.6 |
| | work more effectively in groups | .618 | 4.1 | 0.6 |
| | critically evaluate firm's strategy | .663 | 4.0 | 0.7 |
| | use information more effectively | .839 | 4.0 | 0.6 |
| | use the skills gained in other parts of the module | .547 | 4.0 | 0.7 |
| | use the learned skills in future jobs | .684 | 4.0 | 0.7 |
| **Affective evaluation** (α=0.84; AVE=0.61) | The Glo-Bus SG | | | |
| | Motivated me to want to succeed in the simulation | .839 | 4.3 | 0.7 |
| | Motivated me to learn about business/marketing strategies | .776 | 4.3 | 0.6 |
| | I find this type of experience conducive to learning effectively | .808 | 4.3 | 0.6 |
| | I find a competitive environment helpful in learning business issues | .719 | 4.3 | 0.7 |
| | This type of learning requires total involvement in the exercise | .744 | 4.4 | 0.6 |

α=Cronbach's Alpha; ***AVE***=Average Variance Extracted

## TABLE 2: Regression Analysis

| | ***Dependent Variables*** | | |
|---|---|---|---|
| | **Conceptual Understanding** | **Skills Development** | **Affective Evaluation** |
| ***Independent Variables*** | | | |
| Experience Generation | .48**(5.7) | .55**(7.1) | .48**(5.8) |
| ***Control variables*** | | | |
| Age | .059(.715) | .113(1.5) | .043(.57) |
| Gender | .011(.138) | .009(12) | .016(.22) |
| $R^2$ | .24 | .34 | .38 |
| F | 12.4** | 19.9** | 17.3** |

B=Standardised Coefficients. **p<0.01(t-values)

**TABLE 3: Mediation Analysis**

| | Affective Evaluation | |
|---|---|---|
| | **Model 1** Experience generation + Conceptual understanding | **Model 2** Experience generation + Skills development |
| ***Independent Variables*** | | |
| Experience generation | .49**(5.6) | .25**(3.296) |
| Conceptual understanding | .17*(2.0) | |
| Skills development | | .58**(7.5) |
| ***Control variables*** | | |
| Age | .04(.519) | .028(44) |
| Gender | .025(.326) | 0.28(.44) |
| $R^2$ | .36 | .56 |
| F | 16.26** | 35.99** |

B=Standardised Coefficients. **p<0.01(t-values)

**TABLE 4: Educational Values Generated by the Game**

| Constructs | Sample of students' comments |
|---|---|
| **Experience Generation** | "A valuable opportunity to experience a real-world business environment with applied learning…integrates cumulative knowledge from all of the management courses and lectures I attended".<br><br>"Learned effective decision-making to develop better business judgment. During 10 weeks, we have been making different strategic and operating decisions about every aspect, including Product Design, Marketing, Assembly, Compensation and Labor Force, Social Responsibility and Citizenship, and Finance Decisions."<br><br>"A great experience that made us learn a lot" |
| **Conceptual Understanding** | "A good experience…gave us an opportunity to learn something new. The different concepts such as the usage of strategies, different ways of marketing the product… made us more informative about the corporate business and I was able to relate theory to the real business".<br><br>"It was a great way to put into exercise the concepts we saw in class…I liked the experience".<br><br>"The simulation is the most exciting part of the module, it helped us to combine the theoretical and practice together". |
| **Skills Development** | "The different skills I learnt…was decision making skills, multitasking, teamwork, compromising, conflict resolution skills, and effective communicating skills".<br><br>"…depth of leadership lessons and skills that I have learnt during this process…this exercise has made a positive impact on me as an individual and as a young professional. I consider this a litmus test for being an effective manager in a real world corporation."<br><br>"A high quality intellectual stretching exercise with a plethora of factors that influences critical thinking, sound decision making for all participants". |
| **Affective Evaluation** | "The simulation game has been one of my most enjoyable courses this session and I am disappointed that the game has come to an end, it has been a wonderful learning |

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|---|---|
| | experience for both me and my team mates. “ |
| | “It was an amazing experience and was glad to be in this module. GLO-BUS…gave me a very practical knowledge of marketing. This experience has matured my mind in preparation for the business career”. |
| | “This simulation game provided a quite meaningful and interesting experience for me to further strengthen my international marketing theoretic framework”. |
| | “Finally, this was a pretty entertaining experience and the way it was introduced and executed was really enjoyable”. |
| | “…a very rich, intense, and sometimes challenging experience…opportunity to learn on different levels…able to extend my soft skills by working in a cultural diverse group. |

Note: Students’ grammar not corrected.