ENHANCED CRITICAL THINKING SKILLS THROUGH PROBLEM-SOLVING GAMES IN SECONDARY SCHOOLS

Scott Douglas McDonald   RMIT University, HCMC, Vietnam   scott.mcdonald@rmit.edu.vn

ABSTRACT

Aim/Purpose	Students face many challenges improving their soft skills such as critical thinking. This paper offers one possible solution to this problem.
Background	This paper considers one method of enhancing critical thinking through a problem-solving game called the Coffee Shop. Problem-solving is a key component to critical thinking, and game-playing is one method of enhancing this through an interactive teaching method.
Methodology	Three classes of Vietnamese high school students engaged in the Coffee Shop game. The method seeks outcome measurements through the use of analysis of multiple surveys to assess and interpret if critical thinking may have been improved.
Contribution	The study may help to understand the importance of problem-solving in the context of an entrepreneurial setting and add to the variation of methods used to deliver the lesson to students in the classroom.
Findings	The findings show that practicing problem-solving scenarios with a focus on critical thinking in a time limited setting results in a measured improvement of this skill.
Recommendations for Practitioners	The findings suggest that educators could use games more as tools for problem-solving to contribute to their students' learning outcomes around developing critical thinking.
Recommendation for Researchers	More research could be devoted to developing problem-solving and critical thinking skills through game-play models.
Impact on Society	Improved critical thinking skills in individuals could make a greater contribution to society.
Future Research	A comparative study between different high school grades and genders as well as between different countries or cultures.
Keywords	lesson delivery, blended learning, digital technology, learning outcomes, entrepreneurship, mixed methods, learning transfer, gamification

INTRODUCTION

THE GROWTH OF ENTREPRENEURIAL THINKING

The use of games in the classroom has developed at a quickening pace since the 1990s but has attracted more attention recently as pedagogical methodologies have evolved and particularly even more so around business education (Greco, Baldissin, & Nonino, 2013; Hainey, Connolly, Boyle, Wilson, & Razak, 2016). Games may be used in combination with any other pedagogy to enhance its effectiveness defined as:

> …the innovative learning approach derived from the use of computer games that possess educational value or different kinds of software applications that use games for learning and education purposes such as learning support, teaching enhancement, assessment and evaluation of learners (Tang, Hanneghan, & Rhalibi, 2009, p 3).

The research and study of entrepreneurship as a discipline over the last few decades have held its own ground in academe, even upstaging other areas of economic studies due to the steady growth of interest in its field. The collective importance of entrepreneurs, particularly within the emerging economies of nations around the globe (including Vietnam), highlights the importance of an education in entrepreneurship for their citizens (Global Entrepreneurship Monitor [GEM], 2014). Entrepreneurship is the key to a country's economic growth (Faggian, Partridge, & Malecki, 2016; Minniti, 2008). Projections are leaning towards the BRIC economies (Brazil, Russia, India, and China) surpassing the big G7 economies (USA, UK, Germany, Canada, France, Italy, and Japan) by the year 2050 driven by the grassroots entrepreneurial mindset of the developing BRIC nations (Jakovljevic, 2016; D. Wilson & Purushothaman, 2003). Perhaps entrepreneurship education should not be considered as important only for tertiary level students but should also include secondary school students to provide an opportunity for those students that may not be able to attend higher education for whatever reason.

ENTREPRENEURIAL THINKING IN THE CLASSROOM

The reported number of universities and colleges in the USA that offered entrepreneurship as part of their curricula had ballooned from its humble beginnings of a mere dozen or so in the 1970s to more than 1600 by the end of the 20th century (Katz, 2003) and has since increased in number to over 2100 institutions by 2010 (Seppanen & Gualtieri, 2012). At the K-12 level, progress was reported in the US that shows between 2009 and 2015 the number of schools providing standards, guidelines, or proficiencies increased from 19 states to 42 states. In that same 7-year period, the number of high schools requiring an entrepreneurship course increased from 5 to 18 states (JAUSA, 2015).

In developing nations, the number of schools offering entrepreneurship programs falls far behind the West. Vietnam is a typical example of this. Entrepreneurship is not part of the mainstream curriculum in the national universities or secondary schools around the country. Conducting a simple Internet search for Entrepreneurship programs offered at the tertiary level in Vietnam reveals only a handful of hits from the top tier institutions. In regards to the topic of entrepreneurship, the general sentiment of the university students surveyed by the Global Entrepreneurship Monitor (GEM) across Vietnam in 2014 was their 'fear of failing' in starting a business due to their lack of entrepreneurship or even a basic business education. At 55%, the number of students reporting this sentiment, compared to other students surveyed globally, is considered very high for this demographic in conjunction with their feeling of having only limited entrepreneurial capabilities. "It clearly shows that Vietnam should train and equip more business knowledge for the people, starting when they are pupils and students. And thus, it would help young people to be more confident in engaging in entrepreneurship." (GEM, 2014, p. 14).

THE RESEARCH QUESTION

Many people possess the ability and capability to think critically but have a tendency not do so for whatever reason (Sears & Parsons, 1991). It was further addressed by Wagner (1997) that it was in no way possible for anyone to become an expert in any field or specialty whatsoever without actively partaking in the processes of effortful and purposeful critical thinking. There is a desire among educationalists to implement supplementary methods of teaching critical thinking skills to students other than the traditional didactic approaches (Howard, Tang, & Austin, 2015). This paper attempts to answer the question, "Is it possible to enhance the use of critical thinking through the problem-solving elements of a game?" and suggests other possible areas for future research into the entrepreneurial mindset and entrepreneurship education. This study will consider business games in education and how their perceived learning experience, and perhaps the development of critical thinking, could be enhanced through the playing The Coffee Shop game.

LITERATURE REVIEW

GAMES USED IN BUSINESS STUDIES

Active learning and student engagement have shifted contemporary pedagogical paradigms away from the outdated teacher-centered models of lecture halls and textbook lessons around the globe. Today's students demand a learning style that encompasses a full range of technologies that bring together the needs and dynamics of the individual as well as the group and link both passive and active generation and the transferal of knowledge (Ramaley & Zia, 2005). Many learners fall into the category of visual learners, thus making game-playing an ideal delivery mode for fulfilling this segment of the student population (Abedin, Rusli, Tukiran, & Rashid, 2015; Clark & Mayer, 2016; Sims & Sims, 2006).

Simulations and business games are innovative approaches to teaching that provide the learner with a supplement or even a substitute to the textbook and offer a repeatable mode of practicing real skills that were traditionally reserved for apprentices in the field (Aldrich, 2004). In the 1990s, research into business schools reported that upwards of 97.5% of all business schools were utilizing business games and simulations of some sort as a feature in their business programs (Faria, 1998; Wellington, Faria & Nulsen, 1996). Not only have games been used in Business Schools since the 1990s but serious games have become increasingly popular as a way of providing students with entrepreneurial experiences that are authentic in nature (Bellottia et al., 2012; LaGuardia, Gentile, Dal Grande, Ottaviano, & Allegra, 2014; Panoutsopoulos & Sampson, 2014; Usart & Romero, 2013).

Digital technologies are becoming more prominent in the classroom and will continue to make a larger impact as each year progresses until eventually digital methods of teaching and learning will completely dominate the classroom (Schofield, 2014). Although digital versions of business games and simulations are most prevalent in today's classrooms, computers and computer assisted instructional programs are tools used in many active learning models but are proven not as effective when used solely compared to a blended learning model involving multiple features (Brown et al., 2009). This study seeks to identify the effects of a rapidly changing environment that places the focus on the problem-solving aspect of the game. The success or failure of the outcome may be discovered through a combination of a survey analysis as well as an informal debriefing session (not part of this study) where the students are questioned about their perceived learning experience attributed to the game and how this relates to entrepreneurial thinking.

CRITICAL THINKING AND THE ENTREPRENEUR

The entrepreneurial founder of the company named Roaming Hunger stated in a recent interview that game-playing at a young age developed his entrepreneurial thinking by allowing him to try and fail, but fail "upwards" due to emerging from the defeat a wiser player and one more step closer to the goal demonstrating a mindset shared among entrepreneurs everywhere (Resnick, 2015). The

method of learning or absorbing new knowledge that appears to be most favored by the "millennial" generation of today is through game-playing in a digital environment and even more specifically video-game-playing (Smith & Clark, 2010).

Throughout most of the twentieth century, it was believed that entrepreneurship was an inherent characteristic that entrepreneurs were born with and had no practical place being in the classrooms and lecture halls of academia beyond simply being an area of interest because it could not be taught effectively (Johannisson, 1991). A recent study suggests that, even if the entrepreneurial intentions cannot be taught, the result of attending the entrepreneurship course serves a purpose in identifying personalities that may not be suitable for entrepreneurship (Chen et al., 2015). The belief that entrepreneurship could not be taught changed in the early 1980s when some began to question this belief and a paradigm shift evolved towards thinking that entrepreneurship was "not magical or mystical" at all and research began to flourish (Carlsson et al., 2013). Drucker (1985) made the claim that in fact Entrepreneurship is a discipline and therefore could be taught and learned as any other discipline.

Critical thinking skills are crucial for every day survival and are crucial to the successful decision-making that is involved in an entrepreneurial business venture (Brazeau, 2013; Krueger, 2007; Mohan, Mohan, & Ramakrishnan, 2015). Many people possess the skills necessary for critical thinking but fail to utilize them due to the unstructured or 'lazy' nature of their decision-making processes (Fahim & Masouleh, 2012; Sears & Parsons, 1991). It has been argued that entrepreneurs are specifically adept at what could be thought of as connecting-the-dots, and therefore it should be the pedagogical goal of any business program to seek ways to enhance the soft skills such as critical thinking through deliberate practice (Al-Atabi & DeBoer, 2014; Mitchell, 2005). The act of encouraging students to think entrepreneurially includes a certain amount of critical thinking, which is enhanced quite remarkably through problem-solving based exercises (Krueger, 2001). It is through these exercises that the students are exposed to real-world problems which are faced by entrepreneurs. These include the cognition of "me" into the problem itself affecting the decision-making process that relies heavily on critical thinking skills amidst a combination of extreme time pressures and a sense of extreme uncertainty (Souitaris, 2005).

ENTREPRENEURIAL GAMES IN THE CLASSROOM

Today's students have provided an insight into their modes and habits of both learning and working, resulting in media such as the videogame to be taken much more seriously as a tool to be used in education (Greene, 2011). Serious games for students are being developed at a rapid pace to meet the contemporary demands of this growing trend (Lanyi, 2011). Young people playing videogames not only experience the thrill of playing the game but they in fact are learning through the steps needed to enable them to understand the intricacies of the game, usually through semiotics or other graphics of some sort. This learning process is not associated with the traditional methods of observation or reading about a new skill or new knowledge, but is learning through practice (Gee, 2007). Per Dale (1969) and his Cone of Experience, only 10% of learning material read is retained by students whereas almost 90% is retained through participation in activities and simulations that challenge the players with a compelling context. This concept is supported through contemporary research, when teaching difficult concepts, such as soft-skills or entrepreneurial thinking, that cannot be expressed adequately through words alone (Bellotti et al., 2012). Although the concept is relevant in certain circumstances, more recent research states that Dale's initial findings were unsupported negating his claimed validity (Subramony, Molenda, Betrus, & Thalheimer, 2014).

One of the benefits of utilizing games is the fact that they may be repeated or played over and over again allowing the players the opportunities to learn from mistakes made or learned through the practice of playing the game (Pink, 2005). Thus, this teaches players that failure as a set-back is an opportunity to learn and move forward as opposed to failure being an end-point.

In addition to the videogame, there are board-games that are equally as effective as tools for developing entrepreneurial thinking that offer the classroom teacher another option of varying the inputs,

thus, altering the way the game progresses each time it is played. By applying new stakeholder participation, the student is faced with a completely new set of parameters in which to operate resulting in unexpected variants and outcomes. An example of such a successful attempt is SIMGAME, sponsored by the EU's Leonardo di Vinci program and first launched in the 2003-2004 academic school year. Five countries participated in delivering this game to 30 schools in their jurisdiction: Germany, Italy, Czech Republic, Slovakia, and Austria and reported improvements in student learning (Hense, Kriz, & Wolfe, 2009). The purpose for this initial study was to determine if game-playing could improve or enhance the business education programs already in place in these schools, particularly in their entrepreneurial thinking skills as well as develop positive outcomes in the future employability of the students who may or may not have played this game. The success criteria came from a debriefing of the students who have played and allowed them to reflect on their experience and what they perceived to have learned through playing the game (Peters & Vissers, 2004). The following methods and approaches were used in this study in the attempt to determine if a game-playing activity enhances or influences entrepreneurial critical thinking in secondary school students.

METHOD AND APPROACH

STUDY PROCEDURE

The design of the game used was developed from prior research into effective games used for education that could assess the effectiveness of the outcome for learning opportunities. Features such as instructional tips, suggested timeframes for playing the game, instruments used for measuring and analyzing outcomes as well as suggestions for stimulating conversation and discussion following the completion of the game were incorporated into the design of the Coffee Shop game (Heineke & Meile, 1995, 2000). A similar study analyzing the effects of teaching inventory management through a game involving the production of hockey sticks was referenced to model the design concept of the game used in this study (Klassen & Willoughby, 2003).

The Hypothesis: Students are taught to think critically as an effect of playing an entrepreneurial problem-solving game.

This is testable through the established variables of the game (described in The Design) and the outcome of each survey administered as well as by eliminating other controlled variables generally found outside of the "safe" classroom environment.

The study was conducted in the following sequence: student recruitment, record demographics of each student participating, initial questionnaire conducted, game-play, second questionnaire conducted, and analysis of data collected from the questionnaires.

The recruitment for this pilot study was conducted for one 90-minute period at a private International Secondary School in Ho Chi Minh City, Vietnam in 2012. The participants were secondary school students enrolled in a Cambridge International Examination IGCSE Business Studies course. Each student was either 13 or 14 years of age, and the participants included students from three different classes resulting in a total of 72 students of which 33 were female and 39 were male. Although it was understood that active learning and using games as part of a lesson delivery in the classroom enhanced the learning opportunity for students, this study sought to show the benefit of adding time-limited problem-solving features that ultimately aimed to develop an entrepreneurial thinking mindset in the students involved in the study. The students were informed of the study prior to the playing of the Coffee Shop game and told that their participation was not a requirement and would not affect their grade if they opted out. The result was that no student declined. After conducting the pre-play questionnaire and introducing the game and its rules to play, each class spent 45 minutes playing the game one time and afterward completed a second post-play questionnaire administered by a 3rd party (another teacher). The resulting answers to the two questionnaires were collated and analyzed.

THE GAME

THE DESIGN

The game designed for this study (the Coffee Shop game) follows the basic outline for any game used to stimulate a learning opportunity for the individuals playing the game. Specific features of the game should include quantifiable outcomes that come from the use of variables that the players influence based on following the rules before playing the game. The purpose of this being that each player absorbs the underlying lesson instead of focusing on the logical conscious play of the game (de Freitas, 2006; Koster, 2005).

The game setting designed specifically for this study is based on the daily operation of a Coffee Shop, which was familiar to all participants. This adds not only a feel of familiarity but is quite common in Vietnam. Coffee is the second highest agricultural export earner after rice and is of great importance to the Vietnamese economy (Giovannucci, Lewin, Swinkels, & Varangis, 2004).

The game could be played individually or in small groups. Ideally the game would be played individually to provide a more accurate measurement of the outcome, but due to the limitation on time and equipment availability, this study was conducted using five or six small groups of four or five students each (depending on the class size) playing as a team. Additionally, group activities in school are embedded in the Vietnamese education system and more likely to be perceived favorably by the students participating in the study (Kumar & Laakso, 2016).

Each team was equipped with an electronic tablet device with Internet access that provided the platform necessary to play the game. The initial MS Excel spreadsheet, with a predetermined starting point, was displayed on each team's tablet. The spreadsheet was set up in a typical 'tabs, rows and columns' configuration. Each row represented a different commodity used in a typical coffee shop in Vietnam, such as sugar, milk, coffee, tea, as well as consumables, such as napkins, plastic cups, straws and so forth. Each row had an on-hand quantity represented by a number in the column to the right of the item's description followed by another column displaying the item's unit of measure. The second tab labelled 'Price/Lead-Time' provided the students with quantity price breaks and the various lead-times for each item listed in the first tab labelled 'The Coffee Shop' as well as with a column to enter their purchased quantities. This column had the only data that could be accessed and changed by the students as they inputted their purchased quantities. All other rows and columns were protected cells. The students had to access the second tab to determine and execute the 'best' buying decisions for their coffee shop. Each team began with a budget of 1,000,000 VND (Vietnamese currency). As each purchase was made to resupply the coffee shop, the purchased amount was deducted from this budget viewed on this same tab as well as the main game page (tab one). The game was launched by the teacher entering a 'consumption' quantity in the 'host' computer. The algorithm written into the equation affected each inventory item appropriately by the number entered as 'consumption', which was the usage per customer and the sales price of that item (each result affected the budget). The second option for the teacher was to simply reduce the on-hand quantities as a loss explained by unforeseen real-world circumstances such as pilferage, acts of nature, spoilage, rodent or pest contamination. These actions reduce the inventory items' on-hand quantities to reflect the result of this deduction, which may even reduce the number into the negative (stock out) depending on the unit of measure for that item. The teacher allowed a specified time (1-5 minutes) for each team to analyze and determine the re-order quantity of the items they chose to purchase for that period (considering the price/lead-time variables). The time was counted down on a clock projected on a wall or screen somewhere in the classroom. Once the teacher had 'entered' the new data, the time window closed for the teams to input their decision if they had not already done so possibly affecting their inventory in a negative way. Individual 'consumption' time periods entered by the teacher could be considered as a day, week, or a month determined to be appropriate for the class and the game. The game was played for the duration of the allotted period or until the teacher halted the activity.

THE OBJECTIVE OF THE GAME

The objective of the game is to control the number of supplies and their quantities needed to efficiently operate The Coffee Shop from day to day, week to week, or month to month with the highest profit margins possible. The individual or team (determined by the teacher) with the highest VND (Vietnamese currency) and no 'stock out' at the end of the 30-45 minutes of play is the winner. The inventory levels, demand, order history, and costs are all recorded on the game spreadsheet containing predetermined 'starting-point' data that tracks the inputs and thereby each decision made by the players or the team, and is automatically updated by the profit/loss column in the spreadsheet. To emphasize and practice the use of critical thinking skills, the teacher or instructor may introduce various problems or crises regarding the shop's supplies or customers into the game that affect each player or team equally and ultimately affect the game's outcome (depending on their reaction to the changing scenarios). Besides the standard consumption rates of the customers, other factors, such as rodent contamination, weather effects, robberies, or errant shipments, may be introduced at any time during the play. The game progresses daily, weekly, or monthly every 1-5 minutes (adjustable) depending on the skill level of the players or teams to be determined by the teacher. The number and type of problem along with an accelerated clock (adding an element of urgency) is where the observable learning opportunity reveals itself. Repeated play and the number of interchangeable scenarios (described above) is where a contributable level of entrepreneurial thinking may be developed. The Coffee Shop game could also be used to enhance lessons related to inventory management or procurement exercises or warehouse management, but for the purposes of this study, the development of quick-thinking (Kahneman, 2011) and critical thinking skills were the targeted outcomes as these are elements associated with an entrepreneurial mindset (Gomezelj Omerzel & Antoncic, 2008).

ASSESSING THE LEARNING OUTCOMES

BUILDING THE ASSESSMENT INSTRUMENT

To assess the game's learning outcomes, it was essential to design and combine the written "before and after" questionnaires completed by the students used as the primary instrument (Erhel & Jamet, 2013; Westbrook & Braithwaite, 2001). The questionnaire attempted to indicate any prior knowledge that each student may or may not have known regarding the subject matter involved in the game before play and use this to compare with the knowledge the same students displayed at the conclusion of the game. Answers would be compared from the two questionnaires looking for any knowledge gained as well as any improvements in performance. The challenge, as with any questionnaire, is whether the questions and answers could reveal the data needed to show evidence of meeting the objective.

ADMINISTERING THE QUESTIONNAIRES

The students in these classes were not native English speakers but had been enrolled in Cambridge English classes for at least the prior five years at the school and had demonstrated their proficiency in English to enroll in the Business Studies course. To seek any prior knowledge, the questions asked for vocabulary definitions and other simple business operations and their concepts that had not yet been introduced to the students at their grade level. The students played the game and then were provided with the second questionnaire and a discussion debrief where students shared their experiences among the rest of the class as a wrap-up to the lesson. The results of that discussion were not part of this study. These activities took place within a 90-minute tutorial session for each of the three classes involved. This included administering the first survey, one 45-minute round of playing the game and then the administering of the second survey. The school's rigid tutorial schedule would only allow for one 90-minute (double 45-minute period) time slot for the use of this study.

THE QUESTIONS USED IN THIS STUDY

The questionnaires were designed with simplicity in mind and an attempt to cover the areas related closest to the learning objectives (Brace, 2008). Both questionnaires can be found in the Appendix. The first question asked for a short answer providing an overview of running a coffee shop for profit to check the student's understanding of the connection between effective operations and the profit made by the business. The second question asked about knowledge of maintaining levels of supplies needed to operate a coffee shop and what they knew about on-hand inventory versus demand to check for understanding of the relationship between supply and demand. The third question asked about the cost of purchasing supplies and the student's ability to grasp the idea that more than one factor contribute to a purchasing decision. The fourth question asked if it was easy or difficult to run a coffee shop operation seeking the student's initial perception of running a small business. The fifth and sixth questions asked if he or she had either worked in or read anything about running a coffee shop business before or had they ever been taught the basics of business operation at any time during their years at school to determine if this could play a part in the student's learning outcome.

The follow-up (post game) questionnaire asked more specific questions related directly to the Coffee Shop game and were used in the attempt to determine if any learning had in fact taken place. The first several questions were repeated from the initial questionnaire to check for any new understanding by comparing the 'prior to play' answers with the 'post play' answers. The new questions added to the second survey were the following. Do you feel that your decision-making skills have improved by playing this game? This is a Likert Scale model seeking gain the student's perception of their own improvement in their decision-making processes. The second question asked more generally if they felt that the Coffee Shop game was a learning experience. This too was a Likert Scale model seeking how strongly the students felt that they had in fact learned something from playing the game. The students initially beginning the Coffee Shop game had assumed that it is a simple inventory replenishment exercise and whoever has the optimal levels of inventory and the most money at the end of the game wins. The teacher/administrator may add in various elements affecting the status of supply levels or costs thus changing the direction of the play or may let the game play through to completion without these additions.

RESULTS OF THE COFFEE SHOP GAME

THE ANALYSIS USED

When the survey results were collated and analyzed, it was determined that the students improved their problem-solving/critical thinking skills through playing the Coffee Shop game. Using a matched pairs t-test in Microsoft Excel to determine the comparisons of the initial 3 questions, the alternative hypothesis was tested as to whether these students had made any improvements by scoring higher on the second questionnaire after playing the game. A similar study used this method to measure learning improvements in a healthcare game (Westbrook & Braithwaite, 2001) as well as a more recent study seeking improvements in learning because of playing a similar healthcare game (Erhel & Jamet, 2013).

The requirements of a matched pairs t-test are:

1. Data is distributed in a normal fashion
2. The scale of measurement is ratio or interval
3. Both sets of scores are matched or paired

The Null Hypothesis

H_0: $U_D = U_1 - U_2 = 0$, is where U_D is equal to the mean of a given population of differing scores or totals across two separate measurements.

The Equation

$$t = \frac{(\sum D)/N}{\sqrt{\dfrac{\sum D^2 - \left(\dfrac{(\sum D)^2}{N}\right)}{(N-1)(N)}}}$$

THE FIRST THREE QUESTIONS

The three questions that began the survey may be compared in a qualitative approach revealing differences between the percentages of correct answers before playing the Coffee Shop game versus the percentages of correct answers made after the game was played. It was also considered just as valid to test the matched pairs of means between individual students in a quantitative approach. The matched pairs approach tests student by student providing a better result than comparing groups of students. Table 1 lists the results of the first three questions and the t-values and p-values. The points and percentages are for correct answers.

Table 1. Matched pairs results for questions 1-3 with t-value & p-value (p >.05)

Question	Point Value	Potential Points	Points Before Game	Points After Game	t-value	One tail p-value	% Before	% After
1	3	216	77	85	2.38	0.009	36%	39%
2	2	144	57	74	4.68	0.00001	40%	51%
3	6	432	243	268	5.25	0.00001	56%	62%

Prior to taking the initial questionnaire, students were not provided with any instruction other than to answer the questions as best they could. It was expected that there would be a wide range of scores depending on each student's prior knowledge of business concepts.

Each of the three beginning questions were asked a second time after the Coffee Shop game was played and showed an indication that the students' collective improvement was evident in the way they scored higher on the individual answers given. Thus, there was sufficient evidence to reject the null hypothesis and supports the alternative hypothesis. The alternative hypothesis H_1 states: Students display an increase in their ability to learn to think critically as an effect of playing an entrepreneurial problem-solving game.

QUESTION FOUR

The fourth question was based on a ranked or ordinal Likert Scale model asking the students about the ease or difficulty in making decisions based on changing scenarios and time restrictions. This method was used in a similar study to measure the outcomes of a healthcare game (Erhel & Jamet, 2013). The scale was labeled starting with 1 being 'quite easy' up to 5 being 'quite difficult'. The question was designed to test the students' perception of complexity. The results of this question (see Table 2) revealed that the students initially perceived the complexity of running an efficient business operation, would be 'challenging' or 'difficult' but after playing the game, the ranks increased towards being 'difficult' and 'quite difficult' for more individuals although not a significant change in perception. Thus, there was not sufficient evidence to reject the null hypothesis and neither was there sufficient evidence to support the alternative hypothesis. The alternative hypothesis H_1 states: Students display an increase in their ability to learn to think critically as an effect of playing an entrepreneurial problem-solving game.

Table 2. Student's perceived difficulty in running a coffee shop operation (p >.05)

Question 4	Before	After	t-value	p-value
1	0	0	0.05997	0.476825
2	1	0		
3	26	15		
4	33	41		
5	12	16		
Students	72	72		

SURVEY ONE – QUESTIONS FIVE AND SIX

The fifth question from Survey One asked the students if they had worked at a coffee shop prior to playing the game. Out of the 72 student participants, only 3 had prior experience working for family businesses that were coffee shops and reported that they only waited tables or helped with making coffee resulting in a minimal knowledge of coffee shop operations.

The sixth question from Survey One asked the students if they had studied Business Operations in any classes prior to playing the game. Only one student claimed to have had studied Business prior to playing the game and when questioned further, answered that this was a home-tutorial lesson taught by a parent. This student only scored marginally higher than the average for all three classes thus was not counted as having had any advantage over the other students while playing the game.

SURVEY TWO – QUESTIONS FIVE AND SIX

Using the z-score for a Likert Scale analysis.

$$z_i = \frac{x_i - \bar{x}}{s}$$

The fifth question that appeared on the second survey asked whether the players felt that their decision-making skills had improved or not because of playing this game. This was also a ranked or ordinal Likert Scale model with 1 as 'strongly agree' to 5 'strongly disagree'. The results of this question (see Table 3) indicate that most students believed that their decision-making skills had improved to some extent: N=72, Mean=3.84, SD =1.217, Z%=45, CV=32%. Using a percentile rank from the Z-Score converts a raw score into a normal score as was found to be an accurate approach (Nielson & Levy, 1994).

Table 3. Results of Likert Scale analysis on improved decision-making skills

Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
28	21	11	8	4

A Top Box Score method was chosen to emphasize the Likert Scale categories with the highest number of selections made in the survey (see Tables 4 & 6). This method is used to highlight favorable findings supporting the hypothesis. In this study, the Top Box Score is the highest number of responses for 'Strongly Agree'. The Top 2 Box Score is the number of responses combining 'Strongly Agree' and 'Agree' to emphasize the total number of positive responses given. This method had been used in similar studies in healthcare measuring patients perceived experiences (Elliot et al., 2015; Kennedy, Tevis, & Kent, 2014).

Table 4. Top Box Score of rating scale data

Results	Number of Responses	Percent
Top Box	28	38.9%
Top 2 Box	49	68.1%

The sixth question which was also asked only on the second survey and was answered using a ranked or ordinal Likert Scale model with 1 as 'strongly agree' to 5 'strongly disagree', tested for perceived learning. The results of this question (see Table 5) indicate that most students believed that the game had resulted in a learning experience for them: N=72, Mean=4.18, SD=1.039, Z%=56.9, CV=25%. Using a percentile rank from the Z-Score converts a raw score into a normal score as was found to be an accurate approach (Nielson & Levy, 1994).

Table 5. Results of Likert Scale analysis on perceived learning experience

Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
39	13	15	4	1

Table 6. Top Box Score of rating scale data

Results	Number	Percent
Top Box	39	54.2%
Top 2 Box	52	72.2%

DISCUSSION AND CONCLUSION

DISCUSSION

After an analysis of the data collected, it could be determined that the results point to an improvement in the students' ability to think critically before making important decisions affecting the Coffee Shop game's outcome. An understanding of basic business concepts was sought through the initial three questions on the survey. All three questions revealed an improvement in the students' understanding from one survey to the next after playing the game. These questions were important to gain an idea of how quickly the students gained the experience or knowledge to answer the questions better with the second chance to do so but the last three questions between the two surveys revealed more of what the study was seeking to test. The answers revealed to the researcher that the students began to grasp the complexity of problem-solving and doing so in what was believed to be through analysis and critical thinking as was determined by the answers they provided. The surveys also revealed that learning takes place through repetition as well as trial and error with rewarding outcomes as an end-goal. During a class discussion about the game conducted directly after completing the second questionnaire, it was determined that the students generally enjoyed the experience and asked to play the game again seeking to better their outcomes and, in the competitive spirit of this age-group, they wished to outscore and outperform their peers. This sentiment could suggest another element for further study focused on the competitive spirit and its influence on decision-making.

LIMITATIONS

Although it appeared the game itself may have improved the students' ability to think critically to make their decisions, it also may have been due to other factors not taken into consideration. Several assumptions had been made that could lead to further studies to account for the following: perhaps

the students had prior experience with similar games, perhaps they had exposure to other material or experiences related to business concepts not discovered through the survey, perhaps skills other than critical thinking were used to determine decisions made during play, perhaps gender played a role in the outcomes, or perhaps other factors not mentioned here. It was determined that the more reliable measure of the objective being met was to repeat the exercise two or more times to gather much more data and provide a larger sample size. Multiple plays of the Coffee Shop game were not possible in the classroom setting at the school used in this study due to the time limitation of an inflexible curriculum schedule and the fact that the number of students could potentially change from one game-playing session to another if played on different days making it a challenge to accurately compare using the same student-by-student model.

The design of the survey used is also limited to a selection of questions that must somehow link to the learning outcome that was intended to take place during the play of the game. Therein lies what is believed to be the foundational weakness of any assessment instrument.

CONCLUSION

The study concludes that the prior research identified in the Literature Review regarding the effectiveness of games played in the classroom, with a learning objective designed into the experience, was in fact confirmed through the play of the Coffee Shop game used in this study and lends to its credibility. The Coffee Shop game along with the lesson tutorial brings together a range of learning styles that contemporary students have been demanding which satisfies both the passive and active learner (Aldrich, 2004; Ramaley & Zia, 2005). Due to the nature of testing students for their learning outcomes using multiple assessments, it is difficult to assume one pedagogical method or technique is measurably better than another because there are determining factors in every measurement that may be overlooked (Gee, 2007).

As already pointed out in earlier sections of this paper, students are more apt to recall their learning experiences if gained through an enjoyable delivery of the lesson (Smith & Clark, 2010). It has been proven through much research that games deliver a positive learning perception to students and should be used more often in the classroom (Griffiths, 2002; A. Wilson, Hainey, & Connolly, 2013). One negative aspect to game-playing in the classroom is the time taken to set-up, play, and assess the outcomes while checking for understanding but is still viewed favorably among educators. The tutorial may be limited to a single learning objective but if games are used prudently they could be a valuable tool for lessons that may be more challenging to teach using a traditional textbook-lecture approach due to the nature of repeated play and further learning opportunities realized (Pink, 2005).

The games or simulations that may be considered as authentic and are used in the classroom as a supplement to didactic teaching standards have been well established since the 1990s with over 97.5% of all business schools adopting this practice (Bellottia et al., 2012; Faria, 1998; LaGuardia et al., 2014; Panoutsopoulos & Sampson, 2014; Usart & Romero, 2013; Wellington et al., 1996).

The Coffee Shop game itself could serve a dual purpose. The first being that students learn about some basic aspects of operating a small business venture such as a coffee shop and the second being that they learn to develop their problem-solving/critical thinking skills which are difficult concepts to teach in the traditional lecture style format (Deng, 2011; Kong, 2014). An additional benefit, if played in teams, is that students may learn from each other's feedback or inputs into the decision-making process while building rapport among fellow teammates and realizing learning opportunities not involving the teacher (O'Donnell & King, 2014).

The use of this game in classroom business lessons may contribute to the growing consensus that digital technologies are becoming more prominent in today's academic environment and will continue to increase its presence to eventually dominate the teaching methods of lecturers and learning methods of students in the coming future (Lanyi, 2011; Schofield, 2014). The soft-skillsets practiced through playing the Coffee Shop game include but are not limited to critical thinking and problem-

solving, which may be viewed as being crucial to the survival and successful decision-making processes needed in today's entrepreneurial business venture (Al-Atabi & DeBoer, 2014; Brazeau, 2013; Krueger, 2001; 2007; Mitchell, 2005; Mohan et al., 2015; Souitaris, 2005).

Although most research into this topic has been conducted at the tertiary education level, this study focused on a younger demographic at the secondary education level and thus may conclude that exposing these students to entrepreneurial skillsets earlier rather than later may better prepare them for business studies in higher education and into their future careers (Hense et al., 2009; Peters & Vissers, 2004).

The Coffee Shop game may be revised to change the settings or the additional inputs to make the rules of play either easier for certain groups or more challenging for others. It was designed to keep the play somewhat simple to administer and maintain in Microsoft Excel. The only changes that additional research may discover is that it may be more beneficial to the players if the game could be shortened but still deliver the same learning outcomes. If a specific lesson could be learned in a shorter time, then perhaps the game could be played more often thus providing the opportunity for greater critical thinking and problem-solving practice and development to take place. Perhaps after further study the opposite would be found to be true and a longer playing time could be more beneficial to the students who play the Coffee Shop game.

A future direction of this research may seek to identify, isolate, and enhance, through game-based learning, specific factors defined as critical thinking such as the rationale, reasonability, and empathy behind the thinking and outcomes expressed by the students, through the Coffee Shop game or a similar game, that was not incorporated in this pilot study. Other factors to consider may include: gender/age differences, country/culture differences, or more specific demographics not identified here. Further research may determine how students may analyze, assess, and improve their thinking processes and develop their virtues of integrity, humility, civility, sense of justice, and confidence (Elder, 2007) which may not only affect their critical thinking skills but also their entrepreneurial skills linked to this mode of thinking.

REFERENCES

Abedin, N. F. Z., Rusli, N. A. M., Tukiran, N., & Rashid, M. E. A. (2015). A survey on learning style indicator between genders and game-based learning in UiTM Seremban. In *1st International Conference on Teaching & Learning, Sept 2015 (ICTL)* (Vol. 14, p. 1).

Al-Atabi, M., & DeBoer, J. (2014). Teaching entrepreneurship using massive open online course (MOOC). *Technovation*, *34*(4), 261-264.

Aldrich, C. (2004). Six criteria of an educational simulation. simulation and the future of learning. *Learning Circuits*. Retrieved from http://www.learningcircuits.org/NR/rdonlyres/F2ED000A-7A59-4108-A6CB-1BE4F4CC1CA5/4719/clark_e2.pdf

Bellotti, F., Berta, R., De Gloria, A., Lavagnino, E., Dagnino, F., Ott, M., & Mayer, I. S. (2012). Designing a course for stimulating entrepreneurship in higher education through serious games. *Procedia Computer Science*, *15*, 174-186.

Brace, I. (2008). *Questionnaire design: How to plan, structure and write survey material for effective market research*. London, UK: Kogan Page Publishers.

Brazeau, G. (2013). Entrepreneurial spirit in pharmacy. *American Journal of Pharmaceutical Education*, *77*(5), 88.

Brown, T., Zoghi, M., Williams, B., Jaberzadeh, S., Roller, L., Palermo, C., & Hewitt, L. (2009). Are learning style preferences of health science students predictive of their attitudes towards e-learning? *Australasian Journal of Educational Technology*, *25*(4), 524-543.

Carlsson, B., Braunerhjelm, P., McKelvey, M., Olofsson, C., Persson, L., & Ylinenpää, H. (2013). The evolving domain of entrepreneurship research. *Small Business Economics*, *41*(4), 913-930.

Chen, S. C., Hsiao, H. C., Chang, J. C., Chou, C. M., Chen, C. P., & Shen, C. H. (2015). Can the entrepreneurship course improve the entrepreneurial intentions of students? *International Entrepreneurship and Management Journal*, *11*(3), 557-569.

Clark, R. C., & Mayer, R. E. (2016). *E-learning and the science of instruction: Proven guidelines for consumers and designers of multimedia learning.* John Wiley & Sons.

Dale, E. (1969). *Audiovisual methods in teaching.* NY: Dryden Press

de Freitas, S. (2006). *Learning in immersive worlds: A review of game-based learning.* Prepared for the JISC e-Learning Programme, JISC, UK.

Deng, Z. (2011). Revisiting curriculum potential. *Curriculum Inquiry*, *41*(5), 538-559.

Drucker, P. (1985). *Innovation and entrepreneurship.* New York: Harper & Row.

Elder, L. (2007). *Our concept and definition of critical thinking.* Retrieved from http://www.criticalthinking.org/pages/our-concept-of-critical-thinking/411

Elliott, M. N., Cohea, C. W., Lehrman, W. G., Goldstein, E. H., Cleary, P. D., Giordano, L. A., ... & Zaslavsky, A. M. (2015). Accelerating improvement and narrowing gaps: trends in patients' experiences with hospital care reflected in HCAHPS public reporting. *Health Services Research*, *50*(6), 1850-1867.

Erhel, S., & Jamet, E. (2013). Digital game-based learning: Impact of instructions and feedback on motivation and learning effectiveness. *Computers & Education*, *67*, 156-167.

Faggian, A., Partridge, M., & Malecki, E. (2016). *Creating an environment for economic growth: Creativity, entrepreneurship or human capital?* Retrieved from https://mpra.ub.uni-muenchen.de/71445/

Fahim, M., & Masouleh, N. S. (2012). Critical thinking in higher education: A pedagogical look. *Theory and Practice in Language Studies*, *2*(7), 1370.

Faria, A. J. (1998). Business simulation games: Current usage levels—An update. *Simulation & Gaming*, *29*(3), 295-308.

Gee, J. (2007). *What video games have to teach us about learning and literacy.* New York: Palgrave Macmillan

Giovannucci, D., Lewin, B., Swinkels, R., & Varangis, P. (2004). *Socialist Republic of Vietnam coffee sector report.* Available at SSRN 996116.

Global Entrepreneurship Monitor. (2014). *A significantly improved environment for business – but difficulties remain.* Retrieved from http://www.gemconsortium.org/country-profile/119

Gomezelj Omerzel, D., & Antoncic, B. (2008). Critical entrepreneur knowledge dimensions for the SME performance. *Industrial Management & Data Systems*, *108*(9), 1182-1199.

Greco, M., Baldissin, N., & Nonino, F. (2013). An exploratory taxonomy of business games. *Simulation & Gaming*, *44*(5), 645-682.

Greene, P. (2011). Serious games: To play or not to play. In C. Henry and A. de Bruin (Eds.), *Entrepreneurship and the creative economy: Process, practice and policy.* Cheltenham, UK: Edward Elgar Publishing.

Griffiths, M. (2002). The educational benefits of videogames. *Education and Health*, *20*(3), 47-51.

Hainey, T., Connolly, T. M., Boyle, E. A., Wilson, A., & Razak, A. (2016). A systematic literature review of games-based learning empirical evidence in primary education. *Computers & Education*, *102*, 202-223.

Heineke, J., & Meile, L. (Eds.). (1995). *Games and exercises for operations management: Hands-on learning activities for basic concepts and tools.* Boston: Allyn & Bacon.

Heineke, J., & Meile, L. (2000, November). *Classroom service games.* Presentation at the Decision Sciences Institute Annual Meeting.

Hense, J., Kriz, W. C., & Wolfe, J. (2009). Putting theory-oriented evaluation into practice a logic model approach for evaluating SIMGAME. *Simulation & Gaming*, *40*(1), 110-133.

Howard, L. W., Tang, T. L. P., & Austin, M. J. (2015). Teaching critical thinking skills: Ability, motivation, intervention, and the Pygmalion effect. *Journal of Business Ethics*, *128*(1), 133-147.

JAUSA, (2015). *The states of entrepreneurship education in America*. Retrieved from https://www.juniorachievement.org/documents/20009/20652/Entrepreneurship+standards+by+state.pdf/494b5b34-42a2-4662-8270-55d306381e64

Jakovljevic, M. M. (2016). Comparison of historical medical spending patterns among the BRICS and G7. *Journal of Medical Economics*, *19*(1), 70-76.

Johannisson, B. (1991). University training for entrepreneurship: Swedish approaches. *Entrepreneurship & Regional Development*, *3*(1), 67-82.

Kahneman, D. (2011). *Thinking, fast and slow*. New York: Farrar, Straus and Giroux.

Katz, J. (2003). The chronology and intellectual trajectory of American entrepreneurship education: 1876–1999. *Journal of Business Venturing*, *18*(2), 283-300.

Kennedy, G. D., Tevis, S. E., & Kent, K. C. (2014). Is there a relationship between patient satisfaction and favorable outcomes?. *Annals of Surgery*, *260*(4), 592.

Klassen, K. J., & Willoughby, K. A. (2003). In-class simulation games: Assessing student learning. *Journal of Information Technology Education*, *2*, 1-13. Retrieved from https://www.informingscience.org/Publications/306

Kong, S. C. (2014). Developing information literacy and critical thinking skills through domain knowledge learning in digital classrooms: An experience of practicing flipped classroom strategy. *Computers & Education*, *78*, 160-173.

Koster, R. (2005). *A theory of fun for game design*. Scottsdale, AZ: Paraglyph Press.

Krueger, N. (2001, December). *Adapt or select*. Babson-Kauffman Entrepreneurial Research Conference, Jonkoping BCERC, Jönköping International Business School.

Krueger, N. (2007). What lies beneath? The experiential essence of entrepreneurial thinking. *Entrepreneurship Theory and Practice*, *31*(1), 123-138.

Kumar, V. A., & Laakso, M. J. (2016). Cultural issues that affect computer programming: A study of Vietnamese in higher education. *Asian Journal of Education and e-Learning, 4*(2).

La Guardia, D., Gentile, M., Dal Grande, V., Ottaviano, S., & Allegra, M. (2014). A game based learning model for entrepreneurship education. *Procedia-Social and Behavioral Sciences*, *141*, 195-199.

Lanyi, C. S. (2011). Developing serious games for 12-16 year old students. *Proceedings of the 2011 Informing Science & IT Education Conference, Novi Sad, Serbia.* Retrieved from http://proceedings.informingscience.org/InSITE2011/InSITE11p521-535SikLanyi333.pdf

Minniti, M. (2008). The role of government policy on entrepreneurial activity: Productive, unproductive, or destructive? *Entrepreneurship Theory and Practice*, *32*(5), 779-790.

Mitchell, R. K. (2005). Tuning up the global value creation engine: The road to excellence in international entrepreneurship education. *Advances in Entrepreneurship, Firm Emergence and Growth*, *8*, 185-248.

Mohan, K. R., Mohan, A. R., & Ramakrishnan, V. K. (2015). An ideal entrepreneur and his ego state. *International Journal of Informative & Futuristic Research*, *2*(11), 4290-4295.

Nielsen, J., & Levy, J. (1994). Measuring usability: preference vs. performance. *Communications of the ACM*, *37*(4), 66-75.

O'Donnell, A. M., & King, A. (Eds.). (2014). *Cognitive perspectives on peer learning*. NY: Routledge.

Panoutsopoulos, H., & Sampson, D. G. (2014). Digital game-based learning in the context of school entrepreneurship education: Proposing a framework for evaluating the effectiveness of digital games. In D. G. Sampson, D. Ifenthaler, J. M. Spector, & P. Isaias (Eds.), *Digital systems for open access to formal and informal learning* (pp. 195-212). Cham, Switzerland: Springer International Publishing.

Peters, V., & Vissers, G. (2004). A simple classification model for debriefing simulation games. *Simulation & Gaming,* 35(1), 70-84.

Pink, D. (2005). *A whole new mind*. New York: Penguin Group

Ramaley, J. A., & Zia, L. (2005). The real versus the possible: Closing the gaps in engagement and learning. In D. G. Oblinger & J. L. Oblinger (Eds.) *Educating the net generation* (pp. 102-122). Boulder, CO: EDUCAUSE.

Resnick, R. (2015). *Entrepreneur*. Retrieved from https://www.entrepreneur.com/article/245895

Schofield, D. (2014). A virtual education: Guidelines for using games technology. *Journal of Information Technology Education: Innovations in Practice*, *13*, 25-43. Retrieved from http://www.jite.org/documents/Vol13/JITEv13IIPp025-043Schofield0465.pdf

Sears, A., & Parsons, J. (1991). Towards critical thinking as an ethic. *Theory & Research in Social Education*, *19*(1), 45-68.

Seppanen, S., & Gualtieri, W. (2012). The millennial generation research review. *National Chamber Foundation, US Chamber of Commerce*.

Sims, R. R., & Sims, S. J. (2006). *Learning styles and learning: A key to meeting the accountability demands in education*. Hauppauge, NY: Nova Science Publishers.

Smith, J. W., & Clark, G. (2010). New games, different rules-Millennials are in town. *Journal of Diversity Management*, *5*(3), 1.

Souitaris, V. (2005, April). *The value-added of entrepreneurship education*. Academy of Management Annual Meetings, Honolulu, HI.

Subramony, D. P., Molenda, M., Betrus, A. K., & Thalheimer, W. (2014). Previous attempts to debunk the mythical retention chart and corrupted Dale's Cone. *Educational Technology*, *54*(6), 17-21.

Tang, S., Hanneghan, M., & El Rhalibi, A. (2009). Introduction to games-based learning. In T. Connolly, M. Stansfield, & L. Boyle (Eds.), *Games based learning advancements for multi-sensory human computer interfaces* (pp. 1-17). New York: IGI Global.

Usart, M., & Romero, M. (2013, October). Entrepreneurship competence assessment through a game based learning MOOC. *International Conference on Games and Learning Alliance* (pp. 252-264).

Wagner, R. K. (1997). Intelligence, training, and employment. *American Psychologist*, *52*(10), 1059.

Wellington, W., Faria, A. J., & Nulsen, R. O., Jr. (1996). An empirical investigation into the nature of the learning process in a computer-based simulation game. *Marketing Education Review*, *6*(3), 15-28.

Westbrook, J. I., & Braithwaite, J. (2001). The health care game: An evaluation of a heuristic, web-based simulation. *Journal of Interactive Learning Research*, *12*(1), 89-100.

Wilson, A., Hainey, T., & Connolly, T. M. (2013). Using Scratch with primary school children: An evaluation of games constructed to gauge understanding of programming concepts. *International Journal of Game-Based Learning*, *3*(1), 93-109.

Wilson, D., & Purushothaman, R. (2003). Dreaming with BRICs: The path to 2050. *Global Economics Paper No. 99*. New York: Goldman, Sachs & Company.

APPENDIX

APPENDIX A

Mr. Scott's Business Game   1   Student ID Number _____ Class _____

All the questions in this survey must be completed before playing the Coffee Shop Game. These questions will help to determine what the students learned from playing the game. In no way, will your answers affect the outcome of your grade in this class. Please answer each question as honestly and as completely as you can.

1. Describe ways that business operations can affect the profits of a company.
   _____
   _____
   _____
   _____

2. What is the difference between buying supplies based on price breaks or discounts versus buying according to customer sales demand?
   _____
   _____
   _____
   _____

3. When keeping your business supplies at the optimal level to maintain your operations, you may need to buy these supplies each week or each month. Circle which factors (more than one is possible) you need to determine to make this decision.

   Price breaks   Delivery costs   Handling costs   Item price   Cash flow   Lead time

4. How easy or how difficult do you think it is to operate a Coffee Shop? Circle the answer from 1-5 that you feel best answers this question.

   1 Quite Easy   **2** Easy   **3** Challenging   **4** Difficult   **5** Quite Difficult

5. Have you ever worked in a Coffee Shop before?   YES   NO

6. Have you studied Business Operations in class?   YES   NO

APPENDIX B

Mr. Scott's Business Game   2   Student ID Number ____ Class ____

All the questions in this survey must be completed after playing the Coffee Shop Game. These questions will help to determine what the students learned from playing the game. In no way, will your answers affect the outcome of your grade in this class. Please answer each question as honestly and as completely as you can.

1. Describe ways that business operations can affect the profits of a company.
   _____
   _____
   _____
   _____

2. What is the difference between buying supplies based on price breaks or discounts versus buying according to customer sales demand?
   _____
   _____
   _____
   _____

3. When keeping your business supplies at the optimal level to maintain your operations, you may need to buy these supplies each week or each month. Circle which factors (more than one is possible) you need to determine to make this decision.

   Price breaks   Delivery costs   Handling costs   Item price   Cash flow   Lead time

4. How easy or how difficult do you think it is to operate a Coffee Shop? Circle the answer from 1-5 that you feel best answers this question.

   1 Quite Easy   **2** Easy   **3** Challenging   **4** Difficult   **5** Quite Difficult

5. Do you feel that your decision-making skills improved?

   Strongly Agree **1 2 3 4 5** Strongly Disagree

6. Was this a learning experience?

   Strongly Agree **1 2 3 4 5** Strongly Disagree

BIOGRAPHY

Scott Douglas McDonald, PhD is a Lecturer at RMIT University located in Ho Chi Minh City, Vietnam. He is the Course Coordinator for the Business Communications program in the Centre of Commerce & Management. His research interests include: Entrepreneurship, Communications, Logistics & Supply Chain Management, Alternative Therapies and Business Pedagogy.