

Post print article
Game-based learning: Teaching principles of economics and investment finance through *Monopoly*

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Highlights

- Behavioral economic principles are effectively taught through the board game, *Monopoly*.
- Simulated learning can highlight decision bias, ethics and inequality-related behavior.
- A well-designed game-based learning process supports personalized learning.
- Disruptive events simulating market turbulence strengthen learning in investment finance.

Abstract

This paper investigates the application of a modified version of the board game of *Monopoly* to explore the content learned and optimization of a game-based learning process. The authors made use of a qualitative cross-sectional research design through content analysis of learning documents for 77 participants and analysed basic behavioral trends over a 10-year period. The results show the breadth of learning through the game of *Monopoly* that was modified by incorporating disruptive elements. Themes include learning about the investment environment,

financial management, alliances and relationships, investment strategies, investment tactics, human behavior in investment finance in addition to personal insights gained. Basic trend analysis revealed consistent overconfidence in investment strategies as well as cheating behaviour. The paper demonstrates the importance of debriefing activities in the game processes, and it also offers instructional designers a framework that can be used for design considerations of game-based learning interventions.

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Keywords

Game-based learning, Monopoly, Teaching Investment Finance and Economics, Learning architecture framework

1. Introduction

As the world is adjusting to the realities of change and complexity, business schools must find new ways to help students think about the factors that influence and determine business success. This is particularly true in teaching economics and finance. For students to develop an understanding and appreciation of the discipline of investment finance, they increasingly require insights into economic principles that determine the outcomes of investment decisions. The field of investment finance is not only complex, but has also witnessed significant shifts in practice, and at the same time, established large gains in knowledge and understanding. Macroeconomic forces, such as the COVID-19 pandemic (Zaremba, Kizys, Tzouvanas, Aharon, & Demir, 2021), together with limitations in decision competencies (e.g. Combrink & Lew, 2019; Jabeen, Ali Shah, Raouf, & Sultana, 2019), hamper the quality of financial investment decisions almost regardless of the

level of sophistication of practitioners. The global financial crisis, along with recurrent asset bubbles and subsequent price collapses, evidence this point. Botos (2018) argued that there is a need for a change in the way economics and finance is being taught, because the basic propositions of rationality and efficient markets have come under dispute. It is therefore important for educators to find impactful ways to teach the role of macroeconomic and behavioral factors in investment finance.

Against this backdrop, this research explores the usefulness of a *Monopoly* game, modified to include black swan events and inequality, in teaching investment finance to postgraduate business students. The use of *Monopoly* as a teaching aid is not new. Many have demonstrated the value of simulation exercises to introduce deep learning and its usefulness as a cooperative learning resource. As an example, Van der Laan Smith (2013) demonstrated the value of using *Monopoly* to teach concepts of foreign exchange risk and accounting for foreign currency transactions in business. Another example is that of Mastilak (2012), who highlighted the usefulness of the game to establish recognition amongst students for the need for accounting information. Wright-Maley (2015) offered four criteria of simulations, stating that they need to be similar to reality, but not overly prescriptive (verisimilitude); allow for diverse developments and outcomes (dynamism and variability); involve interpersonal dynamics (active human agents); and must be goal-directed towards learning through interaction with a facilitator (pedagogical mediation), thus partially including game-based learning.

Tanner and Lindquist (1998) found that the benefits of using the game as a teaching tool extended beyond learning about accounting, as students described gaining a positive attitude, mutual concern for their peers and improved perceived achievement through this learning method.

Ender (2004) modified the game rules to make use of multiple tiers of starting salaries. Coghlan and Huggins (2004) also demonstrated social inequality in US classrooms through a social stratification manipulation of the game rules.

Loon, Evans and Kerridge (2015) demonstrated that experiential learning takes place through simulation, resulting in increases in knowledge and interest in the field of study, in addition to the development of transferrable skills such as team effectiveness and negotiation skills. Wasserman and Banks (2017) argued that even though game-based learning has been shown to be effective, the underlying learning processes are not well known. Therefore, while the value of serious play has been shown in education literature, further research is needed on the content learned and the process requirements of learning specifically applied to modified *Monopoly*. This paper does not examine learning styles or the effectiveness of game-based learning, which is known. Rather, it explores the requirements of an effective process of game-based learning and the nuances of learning in a modified game of *Monopoly*.

Researchers adopt one of three primary approaches to study simulation-based learning; namely testing a theory, demonstrating the case application of simulations, or evidencing cognitive learning that took place (Hallinger & Wang, 2020). The primary aim of this research is to add to the body of knowledge on game-based learning by showing both what and how students learn about investment finance through a modified game of *Monopoly*. In other words, we provide evidence of the breadth of investment finance insights that are gained during game-based learning, specifically through the unique use of the *Monopoly* game. The second objective is to offer an illustration of an integrated pedagogy and decision-making framework to guide instructors in the use of experiential learning design. This addresses the question of process requirements in simulation.

Based on this interdisciplinary view of effectiveness in investment decisions, we demonstrate how a process of game-based learning, coupled with techniques of self-assessment and reflection, lead to a broad range of insights regarding investment decision-making behaviors in conditions of ambiguity and complexity. In this way, our work contributes to an application of serious play that takes place “when actors engage deliberately in fun, intrinsically motivated activities to achieve serious, work-related objectives” (Statler, Heracleous, & Jacobs, 2011, p. 237).

2. Literature review

2.1 Changing pedagogies in economics and investment finance

Because the theoretical understanding of markets and investment behavior is changing, educators require new ways of teaching economics and finance (Botos, 2018). Having concluded personal reflections on 50 years of teaching introductory economics, Hamermesh (2019) concurred that novel ideas in behavioral economics should be added to economic courses. Similarly, investment finance education needs to demonstrate how risk and uncertainty in the environment (Köhn, 2017; Boschkay & Joos, 2021), economic inequality (Ullman, 2020), and poverty traps (Banerjee & Duflo, 2012) impact investment decisions. Behavioral factors such as human bias (Leković, 2020), including overconfidence and self-attribution of success (Czaja & Röder, 2020), superficial or first-level thinking (Marks, 2011), gambler’s fallacies (Stöckl, Huber, Kirchler, & Lindner, 2015), emotions (Raheja & Dhiman, 2020) and greed (Jha, 2016) should be accounted for in investment finance education. Moreover, interpersonal behavioral factors, such as the importance of trustworthiness (Liu, Huang, Jiang, & Messier, 2020) and the tendency to underestimate competitors (Luo, Subrahmanyam, & Titman, 2021), play a significant role.

This drives the need to revise not only the content of investment finance course but also the process of learning. For instance, creating environments that stimulate learning is becoming more important than trying to impart information (Bosshardt, 2021).

2.2 Value of simulation and games in learning

Experiential learning, cases, games and simulations have heralded in an era where learning is student-driven rather than instructor-driven. The best-known model of experiential learning was proffered by Kolb (1984), who said that learning takes place through four stages, namely concrete experience, reflective observation, abstract conceptualization and active experimentation.

Kolb's (1984) process-of-learning model highlights the value of experiential learning, where experience leads to the creation of knowledge. As experiential learning involves reflection on, and the interpretation of, direct experiences through processes of analysis, initiative and immersion (Kolb & Kolb, 2005), simulations as a form of experiential learning offer an opportunity for students to achieve an improved understanding of decision-making and role performance (Greenlaw, Lowell, & Rawdon, 1962) within a situation that represents a facet of reality.

Simulated learning has been an effective pedagogical tool for more than 70 years, with multiple benefits. Its ability to offer students active decision-making experience in a dynamic context, as well as to respond to competitiveness in an uncertain but low risk environment, are most pertinent to our work (Vos, 2014). It is effective in multiple contexts and it is from this basis that simulated learning has benefits as wide-ranging as improved student engagement; higher quality assessments; improved recall; benefits of learning by doing; and positive feedback and evaluation of instructor effectiveness (Lu, Hallinger, & Showanasai, 2014).

We understand that in teaching, simulation games serve the purpose of optimizing learning, although it remains difficult to demonstrate such benefits. We support the view of Gosen and Washbush (2004 in Vos, 2014) that “learning is a complex construct, hard to pin down and therefore difficult to measure” (p. 271). As several meta-analyses have demonstrated difficulties in measuring the effectiveness of games in producing the required learning outcomes (Vos, 2014), examples of qualitative feedback presented later in this paper serve the purpose of showing the personalized nuances of such learning as opposed to simply showing the mean thereof.

Whilst we do not purport that simulation-based learning outweighs traditional models of learning in terms of effectiveness, we do wish to demonstrate, through our case, support for the views of Thompson, Strickland and Gamble (2010), who argued for the importance of integrated learning methods making use of text and cases in combination with simulations. Although the position is not uncontested, research tends to support the view that simulated learning results in subject matter learning and the development of personal capabilities. As an example, Riley, Cadotte, Bonney and MacGuire (2013) recognized positive outcomes of simulated learning such as structural problem-solving capabilities, along with a tolerance for, and even an appreciation of, ambiguity in their study, which was conducted in the field of accounting. Farashahi and Tajeddin (2018) showed the effectiveness of simulations over lectures in teaching self-awareness, interpersonal skills, and problem-solving skills.

Recently, experience-based simulated learning has been studied in multiple disciplines, and significantly also in international investment (Chen & Yur-Austin, 2013), economics (Sierra, 2020), and sustainable development (Prado, Arce, Lopez, García, & Pearson, 2020). Within the financial disciplines, where simulation approaches range from buying and selling activities (Phillips & Graeff, 2014) to the simulated management of investment portfolios. In this vein, Van

der Laan Smith (2013) illustrated how students make use of *Monopoly* to maintain financial records while conducting transactions. Variations occur as the instructor adjusts exchange rates during the game, resulting in experiential learning of accounting for foreign currency transactions.

2.3 Games and learning

According to Faria, Hutshinson, Wellington and Gold (2008), games have been used in management training since the 1930s. In the 1960s, Cohen and Rhenman (1961) commented that “management decision games have become increasingly popular as a means of entertaining executives, as a training device for management, and as a teaching aid in university business schools” (p. 131). The authors went on to highlight several benefits of game-based learning, including at least four core benefits that are relevant to our work, including dynamic decision-making with immediate feedback; the experience of risk and uncertainty and associated ambiguities; familiarization with the environment through exploration; and the reinforcement of analytical tools.

Simulation activities in the form of games draw on the importance of play in human experience. Kark (2011) suggested multiple benefits of play in learning, i.e. it represents one of the highest forms of experiential learning in that learners take responsibility for their own learning; value is created through process (fun) and outcome (utility); and by being recursive, game playing allows for new perspectives in familiar experiences. Furthermore, games present a means of building excitement, anticipation and engagement amongst students, especially when risk-taking and uncertainty form part of the design (Robinson, 2013), which is the case in our simulation. Further, there is some evidence that the positive experience of games in learning may happen regardless of whether the player prefers to learn through concrete experience, reflective observation, abstract

conceptualization or active experimentation (Kolb, 1984), as the game can be framed according to participants' preferences (Garber, Hyatt, Boya, & Ausherman, 2012). Goi (2019) found 12 categories of benefits of simulation games in literature, namely, "competition, experience, analytical exercise, strategy, decision-making, learning and objectives, collaboration and teamwork, motivation, application of theoretical concepts, active learning, integration of ideas, and an element of fun and enjoyment" (p. 345). Given the value of simulations and game-based learning, we need to ask whether there are ways to optimize learning through games.

2.4 Requirements of successful learning simulations

In line with experiential learning theory, which indicates that reflection and interpretation are essential components of the learning process (Kolb, 1984; Itin, 1999). Onofrei and Stephens (2014) stressed the importance of post-game analysis in learning. In this phase, students are made aware of how their reactions and decisions impacted the outcomes, which they are normally unaware of during play. Likewise, Crookall (2014) maintained that learning outcomes are only maximized through a process of engaged debriefing. Garris, Ahlers and Driskell (2002) suggested that the game process model consists of inputs of instructional content as well as the game's characteristics. During the game cycle itself, user judgment, behavior and system feedback come into play. This is followed by a process of debriefing. Together, this results in achieving the learning outcomes. Further to this, Gros (2007) made the point that games "provide complex environments in which content, skills, and attitudes play an important role" (p. 26). This underlines the importance of contextual and personal factors in the success of games as learning interventions.

Recently, Laverie, Hass and Mitchell (2020) demonstrated that learner involvement during simulation is a prerequisite for the development of higher order thinking and knowledge through

a marketing simulation. Student engagement increases when they perceive the game to be valuable to developing skills and performance, experience positive emotions, and believe others want them to participate (López, Arias-Oliva, Pelegrín-Borondo, & Marín-Vinuesa, 2021).

Brown, Robson and Charity's (2020) research, meanwhile, cautioned that cultural differences may exist, and that Asian students may prefer instructional learning over team-based simulations. There are also gender differences in serious play, with evidence that female participants prefer concrete experiences, whereas male participants prefer abstract conceptualization (Garber, Hyatt, & Boya, 2017).

These examples show a growing map of the process requirements of effective simulations; however these requirements may not be uniform across different disciplines, or for different simulation tools. It is therefore critical to examine the process requirements and learning outcomes for specific simulations, such as for modified *Monopoly* in teaching investment decision-making.

2.5 The value of Monopoly as a teaching tool

Given the range of games that can be employed in teaching, it is notable that literature offers multiple examples of the efficacy of board games as a teaching tool in facilitating attitudinal shifts, cognitive shifts, behavioral shifts and skills acquisition. An example is Mummalaneni and Sivakumar (2008), who found that the board game *You Can't Fire the Customer*TM was effective in shifting the customer relationship orientation of students. Forman (2012), meanwhile, found that a board game, *Executive Decision*TM, offered skills transfers and promoted the ability of gamers to apply these newly acquired skills in the business world. Eisenack (2013) later demonstrated how the board game, *Keep Cool*TM, can develop a common language around issues of sustainability, while Fridman (2010) inferred that the board game, *Cashflow*TM, is effective in

teaching financial competencies, such as an understanding of financial terms, calculative tools and self-insights in relation to finance. In this vein, Mousa (2019) showed how a game could be used to teach not only technical accounting competencies, but also personal competencies such as decision-making, interaction and communication.

Beyond the examples cited in this article, the game of *Monopoly* has also been used to develop confidence in social critiques of inequality in a sociological learning context (Paino & Chin, 2011), and Smith (2017) applied a gender-stratified lens in a modified game of *Monopoly* to indicate lessons learned regarding gender-based inequality.

While some may argue against the real-world applicability of game-based learning, Zagal, Rick and Hsi (2006) highlighted the value of the constrained nature of board game play. Most notably, the simplicity of the board game context enhances the transparency of actions which are then more easily analyzed than real-life settings.

From research articles dealing specifically with *Monopoly* approaches, we learned that explicit rules should be considered in the modification of the game for the classroom (Dorn, 1989). Mastilak (2012) has also shown how the game is effective in demonstrating investment decisions, but noted that it is through the modification of the rules that specific pedagogical purposes can be achieved. In his example, modifications include, for instance, applying rules that the first property becomes a depreciable asset, making sure decisions are recorded, taking inventory of assets, and asking questions that stimulate learning. An example of the latter entails asking, “How much value should be attached to the properties?” (Mastilak, 2012, p. 49). Significantly, Mastilak (2012) noted that this “approach not only encourages questions, but it allows for discussion of potential alternative answers in their natural context” (p. 49). Ender (2004) modified the game rules by stratifying four income classes, i.e. upper, middle, working and lower. To teach foreign currency

transactions in the real estate market, Van der Laan Smith (2013) included journals, balance sheets and income statement entries in the design, as well as an individual feedback form, while making use of standard rules, and further modified the game by announcing and changing the foreign exchange rate while play is in progress. Van der Laan Smith (2013) said that “instructors can easily modify the exercise to meet specific learning objectives” (p. 187), such as time allocation for a discussion of risk assessment. Tanner and Lindquist’s (1998) learning architecture emphasizes team process and team-based learning, where teams work cooperatively on accounting activities, such as recording ledgers, during the game. They suggested the use of surveys to measure attitudes towards the subject area and learning, in addition to determining mutual concern and perceived achievement. These surveys then become feedback mechanisms that support further learning.

Fisher (2008), in demonstrating social stratification through a modified *Monopoly* simulation, noted that “the effectiveness of the game depends on the delivery of the pre-game instructions and the active monitoring of the game itself” (p. 274). Further elements of the Fisher (2008) learning design include a discussion of the relevance of each rule in terms of how it aligns to reality; the assignment of four different social classes through the roll of a dice; special seating arrangements, such as seating the ‘upper class ruling elite player’ directly opposite the ‘working class player’ in line with the learning outcomes; and preferential treatment and choices afforded to specific social class, amongst other elements. Fisher (2008) also stipulated specific time allocations for each component of the game. More importantly, the author demonstrated the usefulness of well selected debriefing questions. In this example, the questions deal with the event itself (including own gaming behavior); emotions; display of empathy (including how the rich may wish to change the rules); explanation of concepts such as power, prestige and privilege; and how the rules can encourage dishonest behavior.

Coghlan and Huggins (2004) introduced modifications such as legal and illegal opportunity cards, which could result in unequal outcomes such as additional income, the exchange of gifts, instructions to sell property and so on, in addition to opportunity for discussions and structural inequality treatments. They made use of observers to capture the behaviors of players towards each other, and also included reflection exercises following the activity, where the students had to indicate feelings, strategies used, reactions to people leaving the game, and significantly, how the experience linked to the readings or theory.

From the combined literature review of the game-based learning method and specific emerging pedagogies in economics and finance, we distilled five key requirements for an effective learning design making use of *Monopoly*. Specifically, consideration should be given to: (a) clear goals for learning (Garris et al., 2002); (b) the choice of gaming method (Garris et al., 2002); (c) integration with multiple pedagogical techniques (Thompson et al., 2010); (d) a well-articulated learning architecture (including when to reveal relationships with real world scenarios) (Tanner & Lindquist, 1998); and (e) proper preparation of the learning environment (Gros, 2007).

In addition, the design should ensure that the game learning: (a) is student-driven (Laverie et al., 2020); (b) has rules that are transparent (Dorn, 1989); (c) allows for direct experience of principles in a context of risk and uncertainty (Robinson, 2013); (d) offers analytical and decision-making opportunities (Goi, 2019); (e) provides immediate feedback (Cohen & Rhenman, 1961); and (f) allows for play (Kark, 2011; Prado et al., 2020; Robinson, 2013). The final stage of the design should include five learning elements, namely: (a) reflection and interpretation (Kolb & Kolb, 2005); (b) engaged debriefing (Garris et al., 2002); (c) personalized application (Mousa 2019; Riley et al., 2013); (d) real world application (Forman, 2012); and (e) evaluation and assessment (Lu et al., 2014).

3. Method

3.1 Research design

Through this exploratory study, which is based primarily on qualitative data, we sought to understand specific themes that emerged from a modified game of *Monopoly* and to understand the extent to which they aligned to the intended learning goals. Prior to gathering the data, we obtained research ethics approval from the faculty research committee. Students could opt to not have their data included, but all signed consent forms for the use of the data. All data have been reported without identifiers.

The main data source was 77 written reports of between 2,000 and 3,000 words each, where participants reflected on their learning from the game between 2016 and 2018. The participants constituted a cross-sectional sample of 77 of the 673 students who had participated in the modified game by 2018. The reports were analyzed through content analysis (Neuendorf, 2017). In the initial phases of analysis, we used a coding scheme that focused on the investment environment, defined as the market forces impacting investment decisions; investment strategy, defined as strategic approaches to investment decisions; investment tactics, defined as the decision rules that determine investment decisions; and investment behavior, which referred to the behavioral and psychological factors that influence investment decisions. With the coding scheme in place, complete phrases in the self-reflection reports were used as the unit of analysis. Coding rules allowed for the broad categorization of codes according to the coding scheme definitions. New codes and categories were created iteratively for codes that did not fall within the initial coding scheme.

We ensured intercoder agreement (O'Connor & Joffe, 2020) by having researchers analyze the data and compare codes throughout the coding process. Theoretical classifications were used as guide in cases of disagreement, although the codes were easily agreed upon. In the process, new

categories and codes emerged as represented in the findings. The themes that emerged helped us to draw conclusions on what the students learnt during the game. The validity of the analysis was strengthened by aligning themes to the conceptual domains of the constructs, and by clearly specifying the categories.

We also gathered quantitative data over a ten-year period (2009–2018) from the 637 students (see Tables 4 and 5). The aim of this phase was merely to identify certain trends, including winning performance and the prevalence of cheating. These trends were reported through descriptive statistics and were used as catalysts for the debriefing discussions.

3.2. Case study: context, theoretical learning framework and assumptions

Loon et al. (2015) highlighted that the instructional design and curriculum contextualizes learning through simulation. For this reason, it is important to explain the context, assumptions and process of this study. The simulation was undertaken in the setting of a second-year investment finance course as part of a Master of Business Administration (MBA) degree in South Africa. Between 2009 and 2018, two groups of students participated in the game annually, totaling 637 students taking part in 109 games. The course ran over four days, with the overall learning approach consisting of case studies, documentary film material, real-world data, formal academic material, class guests and the simulation, to develop the arguments and ideas around capital markets and investment. Of the 28 hours allocated to the course, five hours were allocated to the simulation during class time, with an additional five hours of independent work required outside of the simulation.

Overall, the course stressed the significant role that capital markets play from a macroeconomic perspective in the allocation of investment resources at all levels of economic activity, such as

international capital flows, investment funding and financial market developments. Significant to the simulation, the course placed an equal emphasis on microeconomic perspectives, including firm-level and individual investment decisions. Our fundamental assumption was that investment finance requires a combination of competencies, including an understanding of capital markets and investment finance; strong analytical ability; and skill in interpreting information and the behavioral responses of market participants.

The simulation focused primarily on the investor psychology and behavior pillars of the course. Contemporary teaching of investment finance needs to consider that the old economic notion that decision-makers maximize value for companies through rational utility maximization has been replaced by insights that financial decision-makers often act irrationally (Thaler, 2018). Behavioral finance recognizes bounded rationality (Simon, 1972), where decisions are influenced by psychological processes and biases (Leković, 2020). According to bounded rationality, decision-makers are limited in conditions of incomplete information, risk, uncertainty, and complexity (Simon, 1972).

Beyond these, other contextual factors such as income inequality or the uneven distribution of wealth have an impact on investment decisions.

One may assume that students will learn sound investment practices and tactics, such as the management of cash and losses, borrowing, and putting up collateral for other investors (“scrip lending”), through an investment game. From a behavioral perspective, one would also assume learning about the intra- and interpersonal factors that impact investment decision-making.

The simulation was therefore based on five assumptions:

1. It gave students an opportunity to experience how biases influence our investment decisions.

This offered a chance to discuss constructs such as agency behavior (Eisenhardt, 1989) versus

stewardship behavior (Davis, Schoorman, & Donaldson, 1997); endowment effects (Kahneman, Knetsch, & Thaler 1990); forecast bias (Easterwood & Nutt, 1999); prospect theory (including risk aversion, reference point, loss aversion and certainty effects) (Kahneman & Tversky, 1979); and the sunk cost effect (Arkes & Blumer, 1985).

2. Financial markets are characterized by volatility and impulsive, turbulent and simply erratic behaviors on the part of market actors. The dot.com bubble, the resources boom of the noughties decade, the financial bust of 2008/09 and the 2015-16 stock market selloff, provide cases in point. Thus, making sense of financial markets is often a complex task, with tools constantly being developed to assist us in better understanding – and so better managing (and perhaps predicting or anticipating) – the behavior of financial markets. Within this context of complexity and ambiguity, investment decision-makers also need to develop skills to deal with chaotic and turbulent events, not only their own erratic behaviors. The simulation therefore incorporated “six sigma” events – such as bank failure and asset price collapse – which are characterized by extreme market volatility that contradict assumptions about the normal distribution of price returns.

3. Behavior and attitudes change in accordance with one’s own socio-economic status and disparities within the various social strata of society and groups within society. The third learning stream of the simulation therefore dealt with socio-economic stratification, income inequality and potential inferences of the impact thereof on investment and interpersonal behavior. Notably, the course was taught in the context of South Africa, a country that is notorious for having gross income inequality. The country’s Gini coefficient, which measures income inequality, ranks amongst the highest in the world.

4. Following from the notion in behavioral economics that irrationality extends into unethical behavior (Ariely, Bracha, & Meier, 2009; Arnett & Hunt, 2002; Mazar, Amir, & Ariely, 2008),

the simulation offered the opportunity to explore concepts of ethical decision-making versus the propensity to cheat during the game.

5. Finally, since we have become aware of the need to contextualize learning in globalized management classrooms (Joy & Poonamallee, 2013), we believe that a team-based game helps students to bridge the gap between theory from the developed world and real world experience in our culturally heterogeneous groups where multiple perspectives prevail.

3.3 Case study: application

We were first sensitized to the possibility of using game playing through the documentary *Games Britannia* (Woolley & Producer, 2009), which explores the history of games. A recurrent message through the documentary is the way in which human interactions in game playing can be influenced by the environment of the game, and that in turn, the game environment and outcomes can be influenced by decisions and behaviors. Considering the interplay of skill and luck in games (Taleb, 2005), we recognized several parallels with the investment finance landscape. Early successes with the teaching method in 2009 gave us a sense of the effectiveness of *Monopoly* in the classroom. We have modified the process continuously ever since to more closely reflect the “real worlds” of economics and finance to include elements of risk, uncertainty, six sigma events and inequality, as specified in Tables 1 and 2.

The simulation activity itself consists of five phases, namely: (a) pre-game preparation and strategizing; (b) game playing with disruptions; (c) post-game debrief; (d) reflection; and (e) evaluation.

In the pre-game activities, we prepare a private room for each small group, minimizing interference. We set up video recorders to capture the behavioral nuances of the game and for later

playback. We also prepare a document on which students can record the full names of players, social stratification position they played, cash on hand at the end of the game, value of assets in possession (based on the card value of the assets), and total value of assets per player after netting out liabilities (if applicable).

The class exercise starts the preceding evening with the students completing the first part of a set of assignment questions. Specifically, the students are asked to form a strategy that they will use to win the game of *Monopoly* and write this down. They are also asked to include details of what they consider to be the risks to their strategy and, if their strategy holds up, where they think they will finish in the game of six players. This assignment is handed in prior to playing the game. The students are also encouraged to familiarize themselves with the standard rules of the game. There are many resources dedicated to the game of *Monopoly*, including guides to game strategy, tactics and statistics, including probabilities. Students are encouraged to undertake online research to help inform their strategy and promote their chance of success in the game.

On the day of the game, the excitement is palpable in the room, giving evidence of the motivating impact of a competitive learning space. Before students go to their rooms to play, an announcement is made that the game has been disrupted and that six sigma events have been introduced that will cause the game that they will play to more closely reflect the realities of economics and finance. We refer to examples such as bank failures, financial fraud and market crashes. The players are divided into small groups of six players each and we use a selection process that promotes high social distance, which generally means players meet each other for the first time in the game environment. While the groups are setting up their boards, we visit each group to allocate advantaged and disadvantaged player positions to each group.

In terms of time allocation, by convention, we start the game mid-afternoon, but set no time limit for play. The game finishes when a clear winner is established via bankruptcy or otherwise by agreement, and at least three-and-a-half hours have passed since the game commenced. The longest running game thus far went on for six-and-a-half hours.

The games are recorded by video in each room, which allows us to use filmed events to illustrate points in the debriefing. During the game, we visit each small group to ask questions to stimulate learning during the game. This includes questions relating to the greatest risk they face in the moment and how they could mitigate this risk; whether they had been able to reliably forecast the game dynamic or if reality is very different from their expectation; and what they might do to alter their strategy given the difficulty of reliable and accurate forecasting.

The six sigma game disruptors mentioned above are introduced in the form of altered *Chance* and *Community Chest* cards, which are shuffled into the off-the-shelf deck. The shuffling is akin to randomness and the events have different payoff profiles, including win-win, win-lose, lose-win and win-win. Table 1 presents the wording of the six sigma cards, divided here into structural, social and legal constructs.

Table 1
Six Sigma Cards Used in the Modified Game of *Monopoly*

Theme	Card Title	Card Descriptor
Structural Constructs	Structural land claim	The player with greatest number of properties transfers four properties to the player with the smallest number of properties.
	Redistributive land claim	The player with greatest number of properties transfers two properties to the player with the smallest number of properties.
	Building restrictions	You've violated building laws. Bribe the inspector with R10,000 or roll two dice to choose an alternative penalty (calculated as dice total x R1 500).
	Bank failure	Your bank has failed. Hand half your cash back to the bank.
	Building boom	Your home is a bank. The two players with the fewest properties receive a windfall cash pile from the bank equal to 50% of their total land value (include houses and hotels if they are owned).
	Building bust	Your home is not a bank. The two players with the greatest number of properties are to pay a once-off penalty to the bank equal to 10% of their total land value (include houses and hotels).
Social Constructs	Capital gains tax bribe	If you immediately pay R10,000 you can avoid your next Capital Gains Tax bill by presenting this card to the bank.
	Economic empowerment	Your economy is grossly distorted in terms of wealth distribution. The poorest player is to get 25% of income from the wealthiest player (until the poorest player has passed "Go" two times after drawing this card).
	Weekend at Bernie's	You've Been Scammed – Give R15,000 in assets to the craftiest player.
	Breaking in	You've Been Robbed. Give your most valuable property to the player to your right. If this property is part of a monopoly, sell all affected buildings back to the bank.
	Drawing blanks	You've Been Conned – All players to give up their highest priced property and sell affected buildings on those monopolies back to the bank (at mortgage price). The forfeited properties can be resold by the bank when play continues.
	Neighbourly dispute	You have a dispute with your neighbour. Fees and penalties equal your dice total x R500. This goes to the player to your left. If you

		have properties with buildings then the dice total is multiplied by R1,000.
	Collusion	There is collusion in the game. By secret vote, identify the player that is guilty of being the most collusive in the game. This player must give one-quarter of their assets to the player/s that received the lowest votes.
	Monopoly	By now you should know monopoly practices are illegal. All players that have a property monopoly are fined 25% of their cash which must go to the player/s with the fewest (or no) monopolies
Legal Constructs	Land tax	All houses incur a land tax of R1,000 per house. All hotels incur a land tax of R8,000 per hotel. This tax is to be paid by all players.
	PAI Act	The Promotion of Access to Information Act requires all players to disclose all business information. By open vote, you must identify the most secretive player. You must then fine that player 10%, 15% or 30% of their cash which goes to the bank.
	Income tax	The “Income Tax” space is remarked to R40,000 for the remainder of the game.
	Capital gains tax	The “Capital Gains Tax” space is remarked to a penalty of R1,000 per building for the remainder of the game. This must be added to a base tax of R10,000.

Note: For the sake of comparison, the average exchange rate of the South African Rand (ZAR) to the United States Dollar (USD) over the game lifetime of 2009-2018 was in the order of ZAR14 per USD1.

As we know from experiences such at the global financial crisis, financial markets have “fat tails”. The frequency and force of the six sigma cards offer a practical appreciation of the impact of market events including extent, uncertainty, unknowability and risk (Knight, 1921; Köhn, 2017).

In addition to the introduction of six sigma events, we have introduced an additional modification to illustrate the impact of social stratification and specifically inequality and interpersonal behavior. In Table 2 we present details of how we stratify the players. We assign the treatments of high, normal and low-income conditions on a random basis to students in each group.

We add labels of “wealthy” and “poor” to the high- and low-income players to emphasize the social dimensions of stratification.

Table 2
Social Stratification of Players

Social Stratification	Modified Treatment
“Wealthy” players	Receives R40,000 in starting cash Salary of R4,000 when passing “Go” Rolls one, two or three dice
“Normal” players	Receives R20,000 in starting cash Salary of R2,000 when passing “Go” Rolls two dice
“Poor” players	Receives R10,000 in starting cash Salary of R1,000 when passing “Go” Rolls one die

Note: For the sake of comparison, the average exchange rate of the South African Rand (ZAR) to the United States Dollar (USD) over the game lifetime of 2009-2018 was in the order of ZAR14 per USD1.

When we debrief in the class after the game, we follow a series of open-ended questions that are explored over an average of two hours per class through focus groups. The discussion is recorded and transcribed. The questions deal with the themes of students’ own behaviors and assumptions while playing the game; the effectiveness or lack thereof of their strategies; how their feelings and behaviors changed in relation to the inequality treatments (and the differences among the advantaged, disadvantaged and normal player behaviors); and whether they acted honestly and ethically while playing.

Following these discussions, we help the class to make links to real world scenarios and understand how the practice in the game links to theory. Thereafter, we give the class members an opportunity to reflect on their individual behaviors and develop personalized action plans to take to help them identify and address behavioral challenges – or issues – that they might face in their investment decisions.

4. Results

The indications of learning from the combined quantitative data, debrief sessions and content analysis of assignment reports reflect personalized learning across multiple constructs of bias, inequality and decision-making in ambiguous situations. The findings thus shed light on the content and the process of learning from a modified game of *Monopoly*.

4.1 Content learned through modified Monopoly

Content analysis of self-reported lessons learned indicate that depth of learning is achieved by playing the game, supported by the business school learning process. This echoes the finding of Sierra (2020) that from a student perspective, there are multiple beneficial outcomes of simulations. Figure 1 provides examples of insights that students have gained regarding the investment environment. As per Table 3, key themes in ranked order are the role of unforeseen risk (Köhn, 2017), the impact of economic inequality on investment performance (Ullmann, 2020), and the role that uncertainty (Boschkay & Joos, 2021), and competition (Arnett & Hunt, 2002; Luo et al., 2021) play.

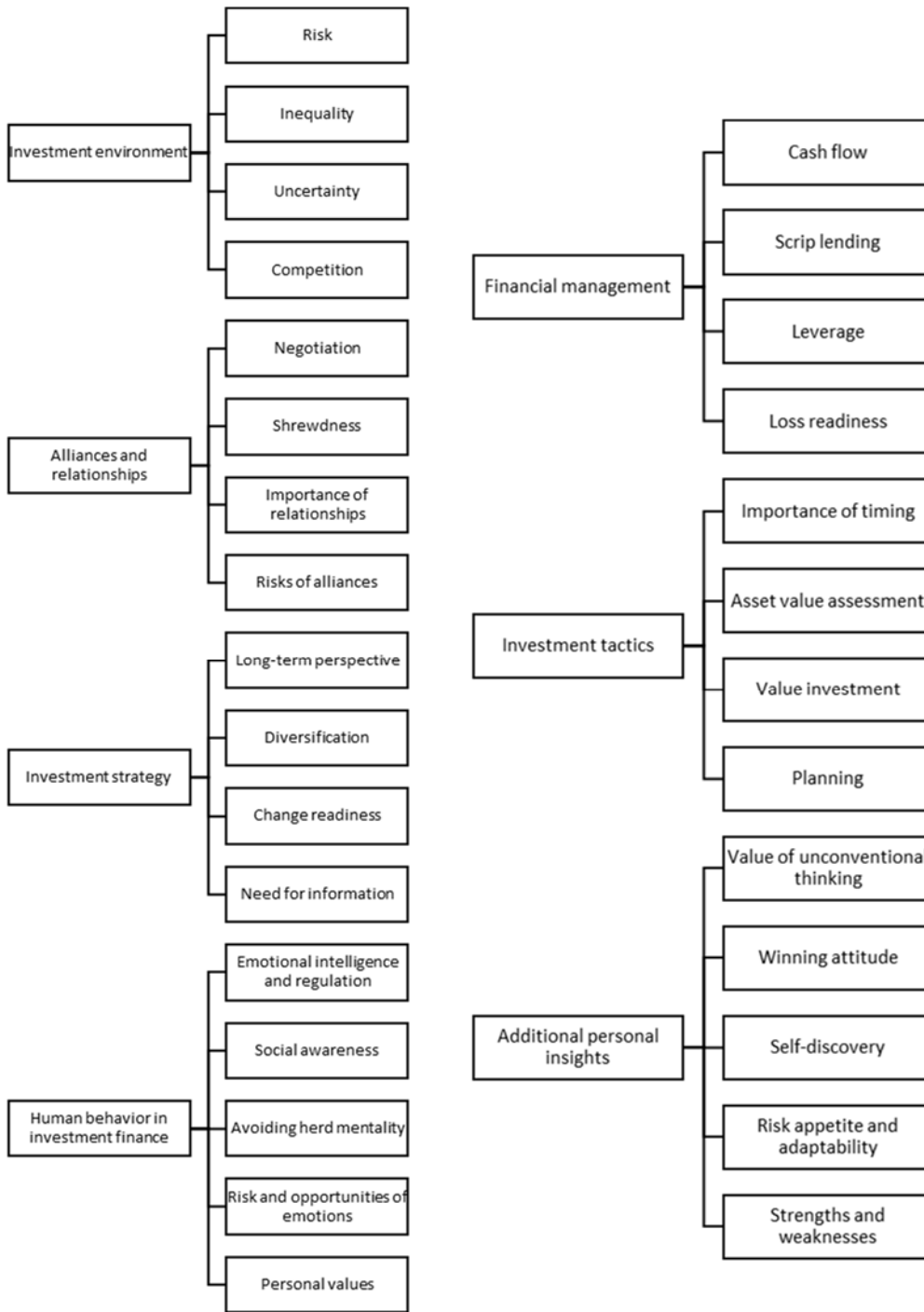


Figure 1
Salient themes of lessons from playing *Monopoly*

Table 3
 Illustrative Quotations of Salient Themes from Assignment Reports (N = 77)

Theme	Category	Illustrative quote
Investment environment	Risk	<i>“Then came the “unforeseen risks”, I say this because I did see it before the game, an information advantage. I knew the cards would come but the impact would be unknown until such time as the cards were presented in the game. Land reclamation completely threw everyone’s strategy out the window.” (Doc12)</i>
	Inequality	<i>“The game demonstrated the impact of wealth, social class and social mobility had on wealth accumulation. The wealthy kept getting wealthier and at a faster rate than the poor. The poor had no chance of catching up.” (Doc29)</i>
	Uncertainty	<i>“That the market is inefficient, and unknowable was my most important learning.” (Doc18)</i>
	Competition	<i>“Also, another principle learnt is not to underestimate your competitions. Chances are you share the same strategy and have the same information.” (Doc17)</i>
Alliances and relationships	Negotiation	<i>“The ability to “read other players” in Monopoly is key to effective persuasion and negotiation. For example, this skill is important when negotiating an offer to purchase a new house.” (Doc8)</i>
	Shrewdness	<i>“I would also conceal my net worth in a future game. Allowing my opponents to see my cash balance and accumulated assets allowed them to alter their strategy. By keeping them uninformed they will not be able to know my financial position which will affect their strategy formulation.” (Doc9)</i>
	Importance of relationships	<i>“I’ve learnt to work on relationships as one team member refused to sell me a property. Networking is of utmost importance.” (Doc75)</i>
	Risk of alliances	<i>“While I knew about cooperation and the formation of alliances in the game, I did not know it was done openly and it happen sooner than I expected. The formation of the cartel was definitely an unforeseen risk for me as I expected to deal with individual strategies.” (Doc11)</i> <i>“I expected houses ... but our game went straight to hotels as the coalition aggregated their buying power. This means the rent I earned off my properties were quickly eclipsed by rent paid to the coalition.” (Doc18)</i>
Investment strategy	Long-term perspective	<i>“As the game progresses, the world of Monopoly becomes more expensive. You need to achieve a certain level of income to maintain your wealth position. You have to always be active.” (Doc45)</i>

	Diversification	<i>“I witnessed inflation, land reform, wealth redistribution, market uncertainty, collusion, hubris, and inflation. You have to beat the market, strategically invest to create a return in wealth. Diversification in your investment assists in ebbs and flows.” (Doc45)</i>
	Change readiness	<i>“A fundamental change to the game occurred after the introduction of the “red cards”. ... This draws parallels with the real-world, in which events such as market crashes and radical government action are often unaccounted for or out of sight altogether, yet have a real probability of occurring and a significant impact on economic outcomes. To illustrate, the first red card drawn resulted in the strongest player becoming one of the weakest and transferred most of his valuable assets to the weakest player (who happened to be myself, at the time). (Doc73)</i>
	Need for information	<i>“To make a good investment you need information of the market, company and products you want to invest on. The cartels made use of knowledge of the game a lot in order to make alliances and pool buy properties in order to buy and secure their assets through acquiring monopolies early in the game.” (Doc46)</i>
Investment tactics	Importance of timing	<i>“When to buy (market timing) and how to structure and manager your debt is of crucial importance throughout the game.” (Doc41)</i> <i>Buying early when assets are still priced low and keeping the investment for longer period will ultimately give you high returns, that’s one key lesson I got from playing this game ... Timing is important in investments.” (Doc62)</i>
	Asset value management	<i>“An important lesson was also not to pay more than the actual worth of something, e.g. some players would pay double the value for a property only to end up without cash for development of the property.” (Doc25)</i>
	Value investment	<i>“The intrinsic value of an investment is very important when assessing whether to invest or not, because assessing an asset based on face value or “the noise” can lead you to missing out on investment that can bring in significant returns in the long term.” (Doc59)</i>
	Planning	<i>What I would carry into the world of finance is a bigger focus on preparation.” (Doc13)</i> <i>“Sometimes you are just not in the right place at the right time to benefit from windfall events, but you should always position yourself to benefit from them.” (Doc50)</i>
Financial management	Cash flow	<i>“You never know what direction life will take you, so it is important to manage your downside risks through sufficient cash buffer. “Cowards live longer”. Purchasing survival is costly – for instance, once of my colleagues offered ‘free passes’ in exchange for cash loans and properties. He traded six passes worth about R60,000 for cash and property worth M1,000!” (Doc29)</i>

	Scrip lending	<i>“Scrip lending can be applied to make money, there is no need to constrain oneself to the immediate environment you find yourself in.” (Doc50)</i>
	Leverage	<i>“You can use leverage to get ahead – relying purely on savings limits your ability to capitalize on opportunities as they arise on a timely basis.” (Doc29)</i>
	Loss readiness	<i>“Knowing (or rather remembering during the heated rounds of gameplay) what I had to lose might have reined me in a tad also, but then knowing that a red card might rip us all to shreds like the financial crisis in 2008 did was all but unavoidable.” (Doc41)</i>
Human behavior in investment finance	Emotional intelligence and regulation	<i>“My greatest strength was that I remained calm during the game which allowed me not to make hasty decisions such as selling or trading a property even when I had low cash reserves and others were making bids so they could form a monopoly and enabled me to negotiate alliances with a level head.” (Doc28)</i>
	Social awareness	<i>“Controlling emotions and maintaining cordial relations with other players in the game is critical to avoid discretionary maliciousness.” (Doc52)</i>
	Avoiding herd mentality	<i>“Never ever sell your position just because the rest of the investor are selling. Stick with your strategy to the end and capitalize where necessary and when it’s time to sell you sell.” (Doc27)</i>
	Emotions as opportunity	<i>“In launching the property fund, I would use “dirty tactics” to illicit frustration and emotion, which negatively impacts on other players, resulting in them making flawed judgements, leading to failed business decisions, in the end resulting in business failures and bankruptcy.” (Doc22)</i>
		<i>“Opportunities exist when other people become emotional – euphoria for selling or buying can present opportunities for you to get a good asset or sell off a fading asset.” (Doc7)</i>
	Personal values	<i>“I did not necessarily change my strategy, but I refused to join the consortium because I felt their values were not aligned to mine and I chose not to join them and went bankrupt gracefully. I chose this route because winning is not everything to me. I do care how I make my money and I care for others more. I lack that killer instinct of winning at all costs.” (Doc7)</i>
Additional personal insights	Value of unconventional thinking	<i>“I also learnt that one should not camp your thoughts as we have done by the rules of the game. If I was thinking out of the box, I could have performed much better. I should also not look at South Africa (my universe) as my only investment possibility. I could also compete with the rest of the world.” (Doc24)</i>
	Winning attitude	<i>“I have learnt that it is important to have a winning mentality right from the beginning ... If you are out there playing with the lions, you better act like one or they will have you for supper.” (Doc26)</i>

Self-discovery	<i>“During our debrief I realized the extent to which I had limited myself strategically. Seven years of tertiary education has taught me to follow rules (real or imagined) too tightly. I can think of several collaborations I could have made within my syndicate, as well as with other syndicates, if only I had tried. Metaphorically, I had bought the boring big stocks, when I could have hustled together a multi-factor investing strategy that suited my goals, time horizon, appetite for bumpiness etc.” (Doc56)</i>
Risk appetite and adaptability	<i>“My greatest weakness was being too conservative with acquiring properties and spending money in the beginning. My risk aversion held me back.” (Doc28)</i> <i>“The lessons that I will carry into the world of investment finance is that the future holds uncertainty and risk, and that I need to be adaptable and openminded to be successful... I have also learnt that price is what I pay for a property and value is what I get from the property (revenue streams from rentals) -- principles which I am sure to apply in the investment world.” (Doc1)</i>
Strengths and weaknesses	<i>“Given the disruptiveness of the red cards, strengths needed to change at each moment, so it would be fatal to depend on one, specific strength and rather an ability to acquire necessary strengths. The thing with strengths in such a disruptive environment is that they can quickly become weaknesses. For example, my strategic acquisition of many colours both increased my wealth, negotiation position and regulator of monopoly turned to a weakness when my wealth was halved.” (Doc45)</i>

When talking about risk (Knight, 1921; Köhn, 2017) and the unexpected cards, one respondent commented:

“Then came the ‘unforeseen risks’; I say this because I did see it before the game, an information advantage. I knew the cards would come but the impact would be unknown until such time as the cards were presented in the game.”

There were rich and multiple lessons on alliances and relationships, showing the importance of skills such as negotiation; shrewdness in interpersonal relationships, such as not giving one’s strategy away; the importance of building relationships for investment success, including trustworthiness (Lui et al., 2020); as well as the risk that alliances may pose to investors (Luo et al., 2021). To illustrate, one participant reflected:

“While I knew about cooperation and the formation of alliances in the game, I did not know it was done openly and it happened sooner than I expected. The formation of the cartel was definitely an unforeseen risk for me as I expected to deal with individual strategies.”

A key insight with regards to investment strategy was the importance of a long-term perspective (Marks, 2011). Participants also learned about the diversification of portfolios, being ready for change, and having adequate information as key insights from playing *Monopoly*. With this, lessons on investment tactics included the importance of timing, and especially early start advantages, the importance of assessing the true value of assets and investing for the long term, coupled with preparedness and planning through one’s investment actions. One participant noted:

“When to buy (market timing) and how to structure and manage your debt is of crucial importance throughout the game.”

Furthermore, there were many insights around financial management, making sure one has enough cash flow, lending strategies such as scrip lending and the use of leverage, as well as anticipating potential loss. This is illustrated by the thought that:

“You never know what direction life will take you, so it is important to manage your downside risks through a sufficient cash buffer.”

The figure also illustrates valuable insights gained regarding the importance of human behavior in investment finance, as well as deeply personal insights about their own behavior during investment decision-making. The participants learned how important emotional intelligence and emotional self-regulation is, as well as awareness of the impact of their emotions on others (Raheja & Dhiman, 2020). Some used their emotions to their own advantage, and the heightened emotions of others as well. They realized that it is important to not just follow the sentiment of others. There were varying views on how their values played a role, with some reflecting on the negative effect that their own greed has had (Jha, 2016), whereas others spoke of following their ethical views rather than winning at all costs. One person said:

“I have learnt that greed is very dangerous and can destroy an investor.”

The students gained not only intellectual knowledge, but also insights about themselves when reflecting on the lessons learned. There were extensive references regarding the value that unconventional thinking can bring to investment and the importance of having a positive attitude (Marks, 2011). One participant illustrated this well:

“I have learnt that it is important to have a winning mentality right from the beginning ... If you are out there playing with the lions, you better act like one or they will have you for supper.”

Other personal insights included having the right risk appetite, being adaptable and open-minded, and not relying too heavily on one's strengths – learnings that carry incredible value. The following quotations illustrate the self-discovery that playing the game in a learning mode can cause:

“During our debrief I realized the extent to which I had limited myself strategically. Seven years of tertiary education has taught me to follow rules (real or imagined) too tightly. I can think of several collaborations I could have made within my syndicate as well as with other syndicates, if only I had tried. Metaphorically, I had bought the boring big stocks, when I could have hustled together a multi-factor investing strategy that suited my goals, time horizon and appetite for bumpiness.”

“I believe that the game taught me a lot about myself in terms of the decisions I make and that I need to be a bit more adaptable to changing situations.”

In conclusion, the results of our adapted *Monopoly* and its integrated learning architecture indicate a depth of learning that can be achieved through game-based activities. Specifically, our formal analysis of learning shows breadth and depth of learning. Our participants learned about a wide range of topics, including the investment environment (Boschkay & Joos, 2021; Köhn, 2017), strategy and tactics (Marks, 2011), which was extended to the practices of optimal behavior and decision-making aptitude in investment processes. The depth of learning applied to personal insights about behavioral changes required that students went beyond cognitive learning about investment. The findings lend further credence to the notion that new insights can emerge through the paradox of intentional fun and learning during play (Statler et al., 2011), and contributes by showing that a learning design that balances play with purposeful learning can overcome the tensions of the paradox.

4.2 Learning process for modified Monopoly

Kolb's (1984) process of learning model indicates that experiential knowledge is assimilated through reflective observation and transformed into abstract conceptualization before active experimentation takes part. The findings of this study confirm the value of reflective observation (Kolb, 1984) through the process of debriefing (Fisher, 2008).

Before playing the game, students reported on their winning expectations and strategies. Two interesting trends appeared: first, in a display of overconfidence (Czaja & Röder, 2020), most students think they will win; and second, many students develop no more than first degree strategies to win the game, which generally involves searching the web to understand the likelihood of landing on certain properties, the most effective way to form monopolies, and so on. In doing this, what they overlook is that their peers generally have done the same thing and arrived at class with identical – or at least very similar – strategies. Marks (2011), who provides the core reference book for the course, refers to this as a first level thinking investment strategy. Later in the course we evidence this principle through this example, as we do with many other principles.

In Table 4 we present additional evidence gathered from the game, including trends on winning performance based on number of participants and gender. We note that almost two-thirds of students (63.6%) have a winning expectation following the development of a strategy, which by far outweighs their probability of achievement (on average a one-in-six chance). This gave an initial indication of investment decision-making overconfidence (Combrink & Lew, 2019), which provides a useful discussion point for the learning debrief phase. We also note that the men in our sample had a lower probability of coming first, with the female subgroup having a substantially higher chance of winning. Smith's (2017) gender stratified Monopoly research showed that the economic status of women is generally seen as less fair, which may explain greater effort by female

participants in our study. This suggests that gender-based differences in serious play requires further research. Bankers also display a higher probability of winning. These outcomes could be explained by behavioral attributes or self-selection biases (Barber & Odean, 2001) that could be investigated in further studies. Thus, the descriptive data offers a starting point to the debrief on investor decision-making behavior.

Table 4
Trends in Winning Performance

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	Average
Number of individual participants	52	50	68	67	66	59	64	68	72	71	63.7
Chance of finishing first (%)	17.3	18.0	17.6	17.9	16.7	16.9	17.2	16.2	16.7	16.9	16.8
Students expecting to finish first (%)	57.7	68.0	61.8	56.7	60.6	69.5	70.3	63.2	63.9	63.4	63.6
Number of female game winners	3	4	2	3	4	3	3	4	3	4	3.3
Female representation in class (%)	17.3	10.0	13.2	17.9	16.7	18.6	18.8	17.6	19.4	18.3	18.9
Female game winners (%)	33.3	44.4	16.7	25.0	36.4	30.0	27.3	36.4	25.0	33.3	29.2
Banker representation in class (%)	17.3	18.0	17.6	17.9	16.7	16.9	17.2	16.2	16.7	16.9	16.8
Banker game winners (%)	33.3	22.2	25.0	33.3	9.1	20.0	27.3	18.2	16.7	25.0	20.8

These findings also proved to be a powerful way to instill a true and experiential understanding of the importance of a critical discussion point of second-level thinking during the debrief sessions (Marks, 2011). In other words, giving the students an opportunity to reflect on the data that showed their overconfidence helped them to gain insight into how their strategies and overconfidence echoes what other investors will do, and how important it is to have the courage to go against the norm (second-level thinking).

Debriefing on actual game-based behavior, with or without video feedback, allows instructors to make students aware of the interplay of emotion, group dynamics and decision-making. As an example, over the years we have observed a strong tendency for students to stand up when stress levels rise, which is a useful illustration of emotions, dominant behavior and power effects. Another recent example was a group of three students in a five student game, who were first anchored by the “leading behavior” of a student who had been accused of conspiring. Her anchoring encouraged the three students to herd behind her and unconsciously “gang up” on the fifth member. The video gave the game participants – and the rest of the class – a valuable opportunity to reflect on their behavior, which would have been harder to effectively explain or evidence through conventional teaching methods.

When debriefing on the role of uncertainty (Knight, 1921) and the impact of the six sigma cards, we have found many common themes over the years. First, despite telling the class that the rules of the game have changed before they play, most students stick to their original strategy. Further, not only do they stick to the same strategy, but they expect the strategy to be as effective under the new circumstances as under the old. Put simply, they see themselves as winners and they imagine that they possess a degree of environmental immunity. Second, the students are quick to note (or complain) about the cards being unfair and how “good luck” or “bad luck” had a major impact on

outcomes. On this front, it is fascinating how many of the students that are recipients of “good luck” go on to describe their strategies as being the greatest factor in explaining the good result, and how many of the recipients of “bad luck” put the result down to just that – “bad luck”. This is indicative of self-attribution bias, or the belief that the outcomes are a result of their own abilities, but failures are not (Czaja & Röder, 2020). Third, despite the cards being randomly drawn – to imitate the way good and bad economic news arrives in the market – students describe this as “grossly unfair”. When we talk about this in more detail as the debriefing goes on, they start to connect the principles with reality. For many students, this is an important moment of realization. As a last point relating to the cards, the six sigma events are changed from year to year; it seems that this “recency” effect helps make the principles easier to grasp and cements the relevance of these principles. We note that localizing the *Chance* and *Community Chest* cards allows for tailoring and customization, with the added benefit of the “recency” effects.

When debriefing on the inequality aspect (Ullmann, 2020) we have found interesting outcomes regarding the relationship between economic stratification and behavior. For instance, “wealthy” students may attribute their game success to their strategy, whilst “poor” students show immediate evidence of despondency, despair and hopelessness and often attribute their position to “bad luck”, describing this as “grossly unjust”. In this way, the game perhaps affords us clues to better understanding modest effects, such as the “hot hand” and “gambler’s” fallacies in behavioral finance (Stöckl et al., 2015). More significantly, it possibly gives clues to more significant and enduring socio-economic scars, such as poverty traps (Banerjee & Duflo, 2012). As one student remarked:

“I thought when someone was trying to help me, they tried to manipulate me. I was stuck in a poor man’s [sic] mentality.”

This echoes a finding of Coghlan and Huggins (2004), who stated that “those who had drawn a lower economic status token, have reported feelings of frustration when other students receiving the higher economic status tokens do not take full advantage of their opportunities” (p. 182). The authors also found stereotypical comments were made about the lower income group, such as that they “belong in jail” or are “lazy”.

In stark contrast, in a recent class, one of the “wealthy” students stated:

“I found that I had more money than what I could spend. I started buying property just because I could, without adding too much thought to it.”

This quote demonstrates some of the irrational behavior or overconfidence often found in bull markets (Odean, 1998).

In terms of the debate between agency and stewardship perspectives (Davis et al., 1997), some comments highlighted agency, such as the statement:

“Being rich was much easier [than being poor] but that doesn’t mean I didn’t have bad luck. It was easy to exploit. I could exploit the situation because of my wealth.”

Stewardship and empathy were evident for others, as one student mentioned:

“I’m the one that wanted to help someone. I felt for my teammate. I wanted to give him a break – I did this by allowing him not to pay his rent.”

As for ethical considerations in decision-making (e.g. Ariely et al., 2009), the debriefing sessions have shown that some students have few or no qualms about cheating, even laughing when admitting to doing so. Many are surprised about the diverse ways in which some players cheat during the game, and an overwhelming number of individuals underestimate the extent of cheating among their group. This lends itself to great opportunities to discuss the importance of ethical decision-making, especially with reference to the field of investment finance. In Table 5

we present some of the trends in cheating behavior we have found; approximately one third of the students are either caught or admit to cheating in the course of the game.

Table 5
Trends in Cheating Behavior

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	Average
Number of students caught cheating	1	0	2	3	2	0	3	2	2	1	1.6
Number of students admitting to cheating	16	19	21	23	20	22	24	19	23	22	20.9
Students caught cheating (%)	1.9	0.0	2.9	4.5	3.0	0.0	4.7	2.9	2.8	1.4	2.1
Students admitting to cheating (%)	30.8	38.0	30.9	34.3	30.3	37.3	37.5	27.9	31.9	31.0	31.5

In sum, the secondary data served as a learning tool, along with observations in the debrief process, to show how different techniques can be integrated into the learning process of serious play.

4.3 Triangulation of literature and findings

Our simulation design set out in Table 6 integrates literature on the requirements of game-based learning and evidence of the learning outcomes of a simulation. The basic phases of pre-game input, game play, debrief and reflection are non-negotiable elements. Moreover, in a world of increasing turbulence (Zaremba et al., 2021), we suggest that disruptions in game process are not only a useful element for building excitement, but also necessary to account for real world decision contexts. The results, because of the wide range of learning insights, support the effectiveness of including the disruptors of risk and uncertainty in the design. The insights contributed to an understanding of how the various elements of the learning architecture of game-based learning and reflection teaches investment decision-making in complex and changing contexts.

Table 6
Learning Architecture of Game-Based Learning

Learning Stage	Points to Consider in Learning Design	Expected Outcome	Our Case Application
1. Pre-game input	Immediate utility Competitive motives	Creation of the need for learning	Students devising their game strategies
2. Game play	Interpersonal/peer dynamics Intrapersonal dynamics Environmental variables Game system variables	Enjoyment and learning through cooperation	Decisions on group size, nature of participants, set-up and game rules
3. Disruption	Risk and uncertainty Social complexity	Systems thinking and decision-making	Modification of the game through six sigma cards and equality disruptions

4. Debrief	Future utility Theoretical linkages	Integration of practice and theory	Open-ended semi-structured questions and discussions
5. Reflection	Personal insights	Personal application and real-world relevance	Assignment writing
6. Evaluation	Quantitative and qualitative evaluation of learning impact Potential improvements of game process	Refinement of process	Course evaluation forms and observations

Design decisions for the pre-game input include activities that heighten the need for learning (Bosshardt, 2021). This supports the realization of immediate utility (Kark, 2011) and competitiveness (Goi, 2019). Multiple considerations need to be taken into account for the game-play phase, of which the first and foremost is that it should represent play with the necessary anticipation, excitement and enjoyment (Robinson, 2013). Decisions around how the environment is prepared are important for this, as oversights regarding classroom size and other amenities could disrupt the value of the game. Likewise, the structuring of groups support collaborative learning, competition (Goi, 2011) and even coopetition.

Designing disruptions requires innovative instructional choices. The disruptions are often the key input that facilitate learning in accordance with the desired learning outcomes and, in addition, they enable systems thinking and enhance decision-making. We have found that these disruptions are particularly interesting for students and produce moments of heightened learning, as mentioned by Robinson (2013). The disruptions should be regularly modified to echo shifts in the environment, and to demonstrate new constructs that emerge from the literature of economics and finance.

We allocate enough time for debriefing sessions (Fisher, 2008), allowing each member of the class to contribute. The debriefing sessions are structured, and the questions and structures are predesigned in alignment with the learning outcomes. A debriefing session serves the purpose of evaluating what transpired and linking that to what may be expected from the perspective of theoretical principles. It is here that the instructor has the opportunity to demonstrate the value and shortcomings of specific theories. On a practical note, some elements need to be handled with care and sensitivity, for example the subject of cheating. Over the years, we have found anonymous surveys to be a robust tool for working with this topic. Beyond this, the debrief session highlights the future utility of the learning.

To personalize the learning (Mousa, 2017; Riley et al., 2013), each student is given an opportunity to interpret what he or she has experienced and learned, and transpose this to their own business activities and lives. Ideally this should be coupled with a goal-setting activity that helps translate the learning into practical utility. Through reflection, students realize the personal applicability of the learning, in addition to interpreting the real-world relevance in their specific situations.

Overall, the instructor should ensure that the game is clearly anchored in no more than four clear constructs or themes that the students should understand. Ultimately, a central aim of the learning at postgraduate academic level is the synthesis and evaluation of theories and constructs.

The final stage in the learning architecture offers students an opportunity to evaluate the learning process (Lu et al., 2014), which is an important feedback loop for the continuous development of the gaming activity. This evaluation not only targets the experience of the event, but also allows students the opportunity to evaluate the personal usefulness, real world applicability and actual learning that has transpired. Opportunity is given to evaluate potential

improvements in the game according to the aims set. Instructors can then consider the value of the feedback carefully to continually modify the learning experience.

This architecture demonstrates how Kolb's (1984) experiential learning cycle can be implemented for a modified game of *Monopoly*. It shows, in practical terms, how instructional designers can help students to transform the concrete experience of simulated learning to reflective observation and abstract conceptualization through debrief sessions, reflection and evaluation. In other words, the learning architecture of the case (Table 6) affirms the need for reflective observation in the debrief and self-reflection stages for learning to take place following the concrete experience of the game-based learning.

5. Conclusion

This paper presents a technique that makes use of *Monopoly* as a method of serious play (Statler et al., 2011) to stimulate thinking and the application of learning around questions that are of high relevance in a changing business world. This specifically includes questions that economists have been grappling with for decades, such as why people behave in irrational ways when making investment decisions, how unexpected events and complex situations impact our behaviors, and why people shift their reaction to others when they perceive themselves to be richer or poorer than themselves. We demonstrate that a game can be used to help people think deeply about these issues, and then turn to instructors, journal articles and research to find answers.

Although this game has been used with modifications in accounting and sociology (e.g. Mastilak, 2012), our experience has been that the value as a teaching instrument readily extends to behavioral economics and that the tool has remarkable capabilities. To this end, we have used the game in a learning context to infer important process and design considerations, to offer to other instructors a framework and supporting principles that may help guide their own learning

design decisions. The paper shows the content that can be learned through a modified game of *Monopoly*, as well as an instructional design that can optimize learning.

Within management science, we have become progressively challenged to teach models and use tools that meet the needs of business in changing contexts, facing diverse and disruptive approaches and unexpected events. The game of *Monopoly* as a teaching tool challenges us to keep thinking how learning that stimulates energy, promotes active engagement with theory, develops practical experience and encourages reflection, can develop critical insights that will help students to be agile in decision-making in multiple contexts.

In interpreting the findings, it is important to note limitations. For instance, the could have been augmented by the social and historical context in which the study took place, and different contexts may deliver different learning outcomes. It is also difficult to isolate the aspects of learning that took place during the game itself, and therefore we present game-based learning as an integrated learning approach that encompasses many learning methods. Moreover, in analyzing the reflections we examined broad categories of learning, and future studies can focus more specifically on distinct economic or behavioral insights learnt through the game.

The findings presented in this study are based on exploratory qualitative data, specifically to highlight the nuanced nature of the themes that emerged. Future research may offer quantitative analyses of the relationships between learning goals and learning outcomes. We believe that the illustrative quotations in this research demonstrate the depth of learning that can take place through a well-designed game-based learning process, and future studies could highlight the relative value of the distinct phases of game-based learning in building knowledge, skills and capabilities.

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