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Developing Subject Revision Cards to Enhance Learning and Engagement in Business Subjects in Higher Education: A Games-based Learning Case Study

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ABSTRACT

Games-based learning is a type of playful learning approach in education to help students to learn and retain knowledge. This is a case study that sought to identify an optimal approach to using games to increase student engagement within multiple business subjects. The study developed and used simple, flexible and customizable subject revision card games in nine business-related modules at a university in the United Kingdom. The result was the development and use of low-complexity and adaptable cards that can be used for multiple purposes and subjects by educators. Furthermore, findings from a student survey (n=55) and classroom observations by teachers supported previous literature in showing that the approach developed here improved student engagement with module content. Six takeaways from the case study for optimal playful learning with the subject revision card games included considering: 1) time constraints, 2) ease of setup, 3) when and how often to play, 4) peer-to-peer versus peer-to-mentor game choices, 5) the perceived value of the game for achieving learning outcomes, and 6) how the purpose impacts the choice of game.

Introduction

Games-based learning – the use of games in education – has been shown to be an innovative and challenging way to engage students with learning and enhance knowledge retention (Plass, Homer, and Kinzer 2015; Qian and Clark 2016). Games-based learning is a pedagogical approach that is inherently aligned with the United Nations' Principles for Responsible Management Education (PRME) Impactful Five (i5): joyful, socially interactive, actively engaging, meaningful and iterative. This i5 is part of a larger identified need within education for teaching which is engaging and intellectually stimulating, developing knowledge for the future, and improving study skills. The core idea is that making classes more enjoyable and interactive can encourage students to engage more with subject content.

Whilst currently in the 4th Industrial Revolution – or Industry 4.0 – where technology is advancing rapidly, there is an increasing focus in higher education on the use of digital tools, simulations and online games (Anastasiadis, Lampropoulos, and Siakas 2018). There is also a growing commercial market of non-digital – also known as analogue – games with annual global revenue growth rates exceeding 5% each year since the Covid-19 pandemic (Statista Market Insights 2024). Analogue games having existed for thousands of years in different cultures around the world, e.g., the Chinese strategy game 'Go' can be dated back to the 4th century BC; however, the growing complexity and variety of successful commercial analogue games is currently an innovative and growing industry. Hence, there is a lack of research on the design and use of analogue games in the higher education sector to increase student engagement with game mechanics that have proven to be commercially successful (Nadi-Ravandi and Batooli 2022; Zeybek and Saygı 2024), particularly in business subjects.

To help address this gap, this teaching and learning case study developed and play tested customised card games for subject revision in nine university modules at the Lincoln International Business School (LIBS) within the University of Lincoln in the United Kingdom. These analogue card games exposed students to the module content in a safe and judgement-free environment; it encouraged self-evaluation and communication between peers as students got excited about guessing the correct word or commiserating with each other over not identifying the answer. The findings from this case study supported the general consensus in the literature showing that educational games improve student experience and increase knowledge retention, as well as provide more pedagogical tools for staff to use in their teaching practice (Manzano-León et al. 2021; Nadi-Ravandi and Batooli 2022; Zeybek and Saygı 2024; De Freitas 2018).

Based on a student survey, as well as observations and feedback from staff and students, six key takeaways for the optimal use of the subject revision cards were identified. These related to considering: 1) time constraints, 2) ease of setup, 3) when and how (often) to play, 4) peer-to-peer versus peer-to-mentor game choice, 5) the perceived value of the game for achieving learning outcomes, and 6) how the purpose impacts the choice of game. While the focus of this paper is on subject revision cards for business subjects, this approach could be adapted for any subject with concepts or words that require students' knowledge and understanding.

The rest of the paper is structured as follows. The literature review section discusses the related literature. Then the methodology section reviews the research approach and steps taken. The results and discussion

section evaluates the formal and informal outcomes from the research based on observations and feedback of both participating staff and students. The final section concludes.

Literature Review

Playful learning is a broad category of pedagogy, which includes games-based learning as one of many types of interactive activities. Conversations in the current literature revolve around the power of playful learning to be "inclusive and empowering"(Abegglen, Burns, and Sinfield 2021), while not letting efficiency goals for enhancing teaching and learning to improve student outcomes ignore that people are more motivated to engage with what they find interesting and enjoyable (Wallin et al. 2021). The journey is just as important as the destination. Due to the breadth of the playful learning literature, there is no existing consensus on correct methods or approaches – and some debate over whether more rigid theoretical frameworks are too limiting to the "playful academic"– but generally, this paper falls in the space of presenting a case study of the implementation of a playful activity for students in higher education (Norgard and Moseley 2021; Skovbjerg, Hijkoop, and Bekkerb 2024). In implementing this playful activity in the form of subject revision card games, a 'playful space' is created that allows students a safe space to take risks, fail and be creative (Nørgård, Toft-Nielsen, and Whitton 2017; Koeners and Francis 2020).

While the literature on game-based learning is scattered across a wide range of disciplines, recent systematic reviews have emphasized the positive correlation between integrating games into teaching and learning and student engagement (Manzano-León et al. 2021; Nadi-Ravandi and Batooli 2022; Zeybek and Saygı 2024; De Freitas 2018; Casau, Dias, and Amorim 2023). Zeybek and Saygı (2024) highlighted that the growing popularity of digital gaming content worldwide, particularly among younger generations, provides an opportunity for educators to use games to improve learning outcomes through increased student 'motivation, engagement, and achievement'. Further literature supported that digital games – including simulations – are on the rise in higher education (Kordaki and Gousiou 2017; Vlachopoulos and Makri 2017).

However, the literature identifies a need for more research and implementation of game-based learning in non-digital or analogue settings, e.g., in face-to-face classrooms (Nadi-Ravandi and Batooli 2022; Zeybek and Saygı 2024). These types of games offer multiple advantages including "more opportunities for interaction among peers, a wider spectrum of activity choices, more flexibility of design and content, and a variety of platforms for playing" (Talan, Doğan, and Batdı 2020, 494). Analogue games offer a physical and tangible learning experience that can show not only cognitive benefits, but also improvements in social interactivity (Smith and Conway 2025), which is becoming increasingly novel given the rise of digital educational content

where interactions tend to be online without any physicality. Analogue games also act as a low-cost and fixed-cost reusable resource – unlike simulations, which often come with higher recurring costs.

Not only is there a need for more research on games that encourage face-to-face interactions between students, but recent systematic reviews found that there are also relatively fewer studies on games-based learning in education literature that focus on business subjects (Nadi-Ravandi and Batooli 2022; Manzano-León et al. 2021; Zeybek and Saygı 2024). Furthermore, of the research on game-based learning in business education, there were few that focused on analogue games, unlike other fields like biology that have enough papers published for its own systematic review on using board games in teaching (Teixeira et al. 2024). Those studies that did use analogue games for business subjects (Lew and Saville 2021; McCarthy 2022; Khan and Pearce 2015; Smith and Conway 2025) tended to use specific commercial game(s) focused on a single subject as a basis for their study with minimal changes to the game itself. This case study instead develops a template for a new teaching resource, i.e., customised card games, that could be used for revision in any subject with or without the mechanics of a commercial game.

Some studies have specifically examined educational card games in various higher education contexts, consistently reporting positive impacts on student learning and engagement (Joseph et al. 2024; Su, Cheng, and Lin 2014; Yu et al. 2025; Mavroudi et al. 2022). Card games are typically low-cost, portable, and easy to implement in a classroom, yet they can introduce game-based interactivity that breaks the monotony of lectures. For example, in Yu et al. (2025) one group of medical students played a card game designed to teach neurological syndromes, while a control group learned via traditional methods. The results after instruction showed the card-game group achieved an immediate knowledge retention rate of ~97%, significantly higher than the control group's ~75%. Even several weeks later, the game-playing students maintained substantially better retention of the material than their peers. The researchers concluded that the interactive, competitive card game approach was more effective in reinforcing and retaining complex subject information than lecture alone. This aligns with other findings that "when games were used, retention may be improved, largely due to a more dynamic learning environment" (Joseph et al. 2024, 207; Abdulmajed, Park, and Tekian 2015). This example underscores a general trend: card games can make learning in higher education more interactive and memorable, thereby improving comprehension and long-term recall of subject matter.

Previous efforts by educators to integrate games into teaching and learning tended to focus on either creating completely new games (Granath and Russell 1999; Vun et al. 2013; Luttikhuizen 2018; Su, Cheng, and Lin 2014; Smith and Conway 2025), or using existing commercial games as a template – such as *Cards Against Humanity, Monopoly* or *Trivial Pursuit* (Efthimiou and Tucker 2020; Murillo 2021; Lew and Saville 2021). There is some evidence in the literature to support that a greater variety and differing levels of complexity in the games that student are exposed to in a course, may increase student motivation (Manzano-León et al. 2021). Hence, in contrast to this previous literature, the game development approach used in this paper's research shows how the educator can flexibly utilise the mechanics of commercially successful games, as well as create new standalone teaching tools. Specifically, the customised subject specific cards were designed by the instructors to create a tailored learning resource. This resource can be used in a variety of ways, with or without game mechanics, to achieve the UN PRME's i5 for playful learning.

Methodology

Most of this case study took place over the course of six months, from January through June of 2024. In early planning meetings – after discussing more complex games such as escape rooms or deck-building games – it was decided that simpler card games were more appropriate. This was the case for increasing the adoption rate by educators and their flexibility, but also for being able to run the game in a relatively short period of time to fit in a typical 50-minute class time. Sixteen commercial card games were investigated (Figure 1) and categorised into two main formats: (1) those using a *single concept per card,* such as *Just One*, *You Can't Say "Umm"* and *Give Me 3* (Table 1) and, (2) those using *question-and-answer cards*, such as *Cards Against Humanity*, *Trivial Pursuit* and *Herd Mentality* (Table 2). The *single concept per card* format was selected as it was easy to pilot, produce and had greater flexibility in terms of the number and types of games that could be adapted for use.

Figure 1: Fifteen commercial games initially considered in the case study.

Name	Description
Just One	A cooperative word-guessing game where players write one-word clues to help a teammate guess a mystery word.
You Can't Say "Umm"	A fast-paced team game where players describe word pairs without using filler words like "umm," "ah", or "err".
Give Me 3	A rapid-fire party game where players must name three answers to quirky prompts within 10 seconds.

Table 1: Examples of *single concept per card* format.

Name	Description
Cards Against Humanity	A party game where players complete fill-in-the-blank prompts using outrageous or provocative answer cards.
Trivial Pursuit	A classic trivia board game where players answer questions across six categories to earn coloured wedges.
Herd Mentality	A party game where players answer quirky questions, aiming to match the majority response.

Table 2: Examples of *question-and-answer card* format.

Four subject revision decks were initially developed by the two leads and two other faculty to be play tested by students. Two of these initial decks were co-produced as informal student input was sought during class to gather ideas for words and concepts to include. Ethical approval was obtained for a student feedback survey to be run concurrently with the play testing. A variety of games were then play tested with students and staff to identify alternative methods of playing with the decks.

The initial four decks were play tested in three modules – Philosophy of Management, Competition & Regulation, and Introduction to Accountancy – and during an extracurricular activity. In the classroom, the researchers tested the application of a concept sort and the rules of relatively simple commercial games, such as *Just One, You Can't Say "Umm"* and *Give Me 3* (Figure 2). After each playtesting session, student responses were collected via a Microsoft Forms survey (see Appendix for survey questions). Student feedback was also present in the end-of-term module evaluations and a debrief was held with some participating staff.

Figure 2: Students playtesting subject revision deck using concept sort (top), as well as students playing and using game kit from *Just One* (bottom).

After this initial playtesting, the researchers invited other faculty at the business school to create their own subject revision decks as part of the case study. The different faculty requested different deck designs according to their vision: single sided with a single word or short phrase; single sided with key words on half the cards and definitions on the other half; or double sided with key words or a short phrase on the front and a definition on the reverse. Together these designs enabled a variety of ways to engage with the cards. The only limitation imposed was that faculty were asked to provide exactly 50 words or concepts.

Fifty was chosen for multiple reasons. The study needed to produce card packs of the same size across modules to benefit from economics of scale with the printing company. Hence, selecting 50 cards provided an affordable solution, whilst also acting as a tool for academics to filter the most relevant content in their modules. Fewer than 50 cards made it difficult to adequately cover the core content in a module, whilst greater than 50 cards ran the risk of activities becoming overly complex.

These 50 concepts were then used to create nine decks for use as a revision tool, for recruitment activities or for student or staff extra-curricular activities. Following the finalisation of the decks, the professional cards were designed and ordered (Figure 3 and Figure 4).

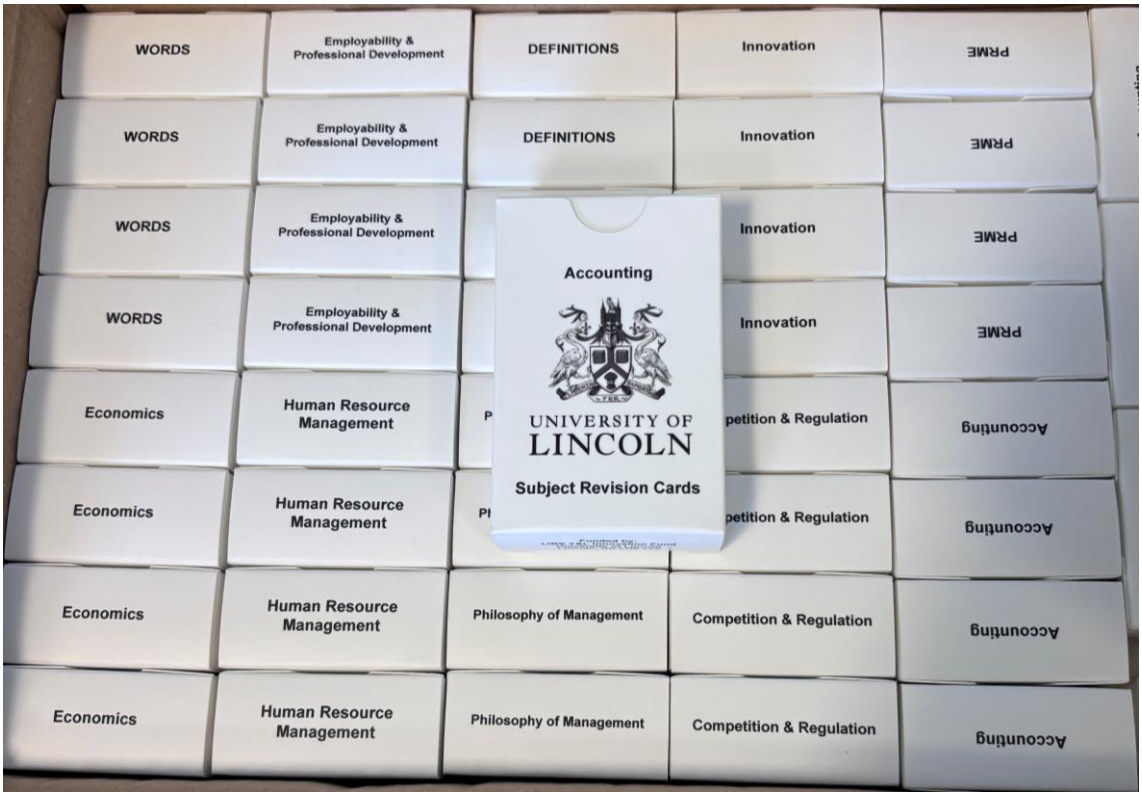

Figure 3: The nine subject revision decks were professionally printed by Ivory Graphics Ltd.

Figure 4: Other than the subject-specific card content, the design of each deck was done in-house and each individual card and box had to be adapted according to an Ivory Graphics Ltd template – on average, two hours per deck. Artificial Intelligence (AI) was used to generate images for the card backs.

At the end, the case study had successfully engaged with a total six faculty, in addition to the two leads, for a total of eight participating staff. The card decks created consisted of 50 individual words or concepts for each of the nine participating subjects, with one subject-specific concept per card. These nine subjects were: Innovation, Philosophy of Management, Employability & Professional Development, Human Resource Management, Principles of Economics, Competition & Regulation, Principles of Responsible Management, Research Methods, and Introduction to Accounting.

Additional digital resources for the customised game packs were also designed to allow students access beyond the classroom, i.e., a single A4 sheet included all cards in a deck that could be printed and played by students at home. A Glossary of Terms table could also be used to add definitions throughout the course as students developed familiarity with the content.

The value of these subject revision cards is that they can be used independently as flash cards or combined with a game or other activity, depending on the needs of the educator. The decks may also be used in a variety of ways through module delivery. For example, in one module, the cards were used in an early session to show the key content covered by the course via having students concept sort the cards into

'known' and 'unknown' piles. At this stage students were unfamiliar with the content, so this provides a useful benchmark for them to reflect on how much they can learn during the course.

Secondly, at the end of specific teaching sessions the cards from that unit were used in a simple game. This allowed students to identify which content was learnt during the session, providing an opportunity to address aspects they may have missed or overlooked. This was also a good time to encourage students to complete the Glossary of Terms, filling in knowledge as it was developed during the course. It is worth nothing that if this approach is used throughout a course, it can be an effective tool to show progression of learning.

Finally, towards the end of the course, the whole deck was used again as a concept sort to see how much was learned and identify any knowledge gaps on theories or concepts that would be helpful for students in completing the assessment. Following this, students played with the cards using rules from *Just One* to solidify understanding of what was known and identify persisting gaps without negative stigma. As these activities were done in groups, it stimulated discussions between peers as they filled in each other's knowledge gaps. This approach also promoted discussions with educators to clarify any content the students were uncertain about.

Results and Discussion

Through the pilot and subsequent integration of the cards in modules, it was found that having a concept sort or a simple memory game allowed students to familiarise themselves with the deck's concepts and then they could play a more interactive game with the deck (Figure 5). In a 50-minute seminar, the concept sort took about 20 minutes, and the game took another 20 minutes, allowing 10 minutes for a debrief whether as a survey or discussion.

Figure 5: Memory game having students find matching Innovation cards (left) and using game kit from *Just One* for the Principles of Responsible Management deck (right).

Several types of games rules were attempted, such as *Give Me 3* and *You Can't Say "Umm"*, but gameplay based on the rules of the commercial game *Just One* was found to be the easiest to organise, explain the rules, and garner student engagement; it was also the favourite of students. While not discussed here in depth, a group did trial a more complex game called *Codenames.* This game required students to identify a single word that would connect multiple concepts from the module; however, student feedback was this was too challenging with the more complex concepts, so it was not included in subsequent game options. From observations, the concept sort was a bit less popular as it lacked game-play elements that engender the i5 principle of joy, but achieved the objective of familiarising students with all the words and helping them identify concepts they did not know (Figure 6). They could then use their phone or laptop to look up the word (or ask the lecturer) to be able to sort the concept correctly into the previously designated categories, e.g., determining if "utility" is a microeconomic or macroeconomic concept.

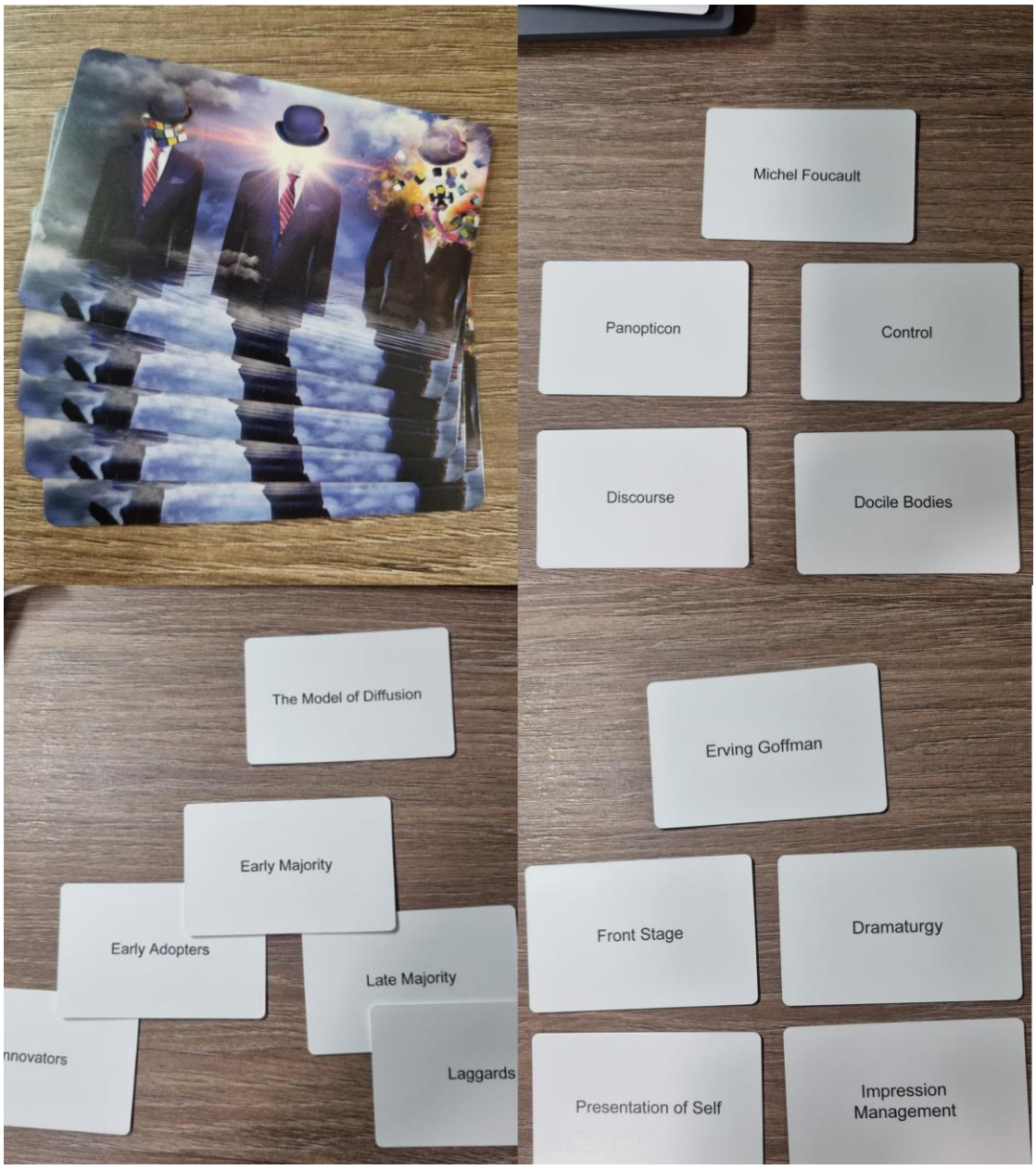

Figure 6: Concept sort examples for Philosophy of Management and Innovation modules.

The student survey obtained 55 responses. On a scale of 1-5 (5 as the highest), 72% of students gave the overall experience a 4 or 5 (Figure 7). The other categories evaluating how fun and educational the games were had a similar rating, while the interactive category had 91% of students ranking the activity highly at 4 or 5. Notably, 33% of students surveyed said their knowledge of key concepts and terms in the module improved by quite a lot and 96% of students said their knowledge improved by at least a little.

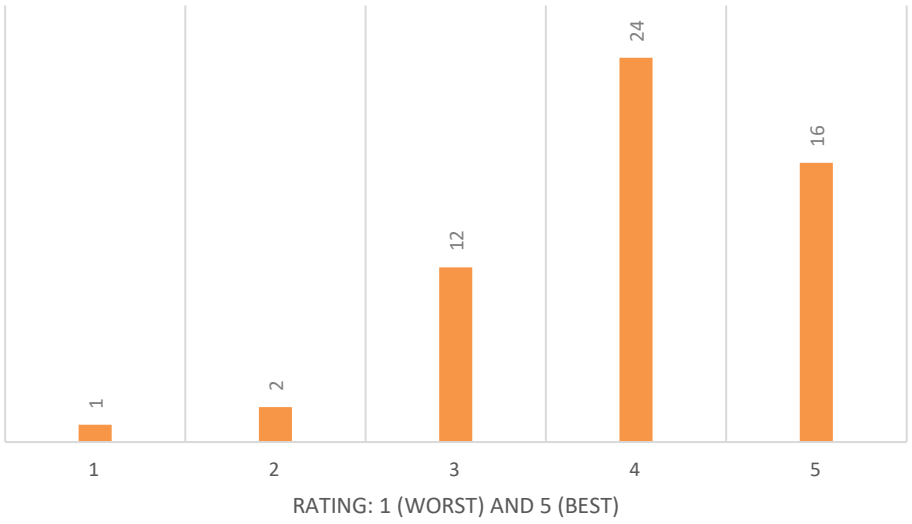

Figure 7: Student Survey (n=55) Count of Overall Experience Rating.

The survey also included questions centred on skills for the 21st century from the World Economic Forum. The top two skills that students found they most used in the games were: 1) Creativity, originality and analysis and 2) Reasoning, problem solving and ideation. These findings were consistent with the findings of the systematic review in Qian and Clark (2016) that most games in the studies focused on the development of critical thinking skills (~70% of 29 studies), with a smaller number also considering creativity (~10% of 29 studies).

Quotes from students on the survey included:

- *"Highly enjoyable."*
- *"I would recommend."*
- *"A wide variety of words made for a good game."*
- *"Very good game, just wish I was more loud and had better social skills, then it would of been great."*
- *"Perfect all round!"*

In the end-of-term module evaluation feedback, students also provided additional comments that they liked the interactive activities and specifically mentioned the games were helpful in learning. Overall, students seemed to most like guessing the words, the interactivity and the game aspect of the activity.

The six key takeaways from this case study include:

- ✓ *Time Constraints:* The concept sort and *Just One* worked well for a 50-minute seminar. Generally, an activity with the cards took 15-20 minutes, so it would not need to take the entire session. The frequency and duration of activities related to the cards needs to be strategically balanced with normal module delivery.
- ✓ *Ease of Setup: Just One* was very quick and easy to explain and for students to understand in a short amount of time. However, a more complex game or activity might challenge students to think more critically around the relationship between concepts in a module, but the trade-off is it will also take more time to explain and play. It was noted that playtesting in a large, tiered lecture hall posed some challenges for playing the games in groups, so the spatial constraints can also impact the ease of setup.
- ✓ *When and How:* The use of the game might have different intentions at beginning versus the end of the module; hence, the educator does not need to use the entire deck every time. Some games like *Just One* could be played repeatedly as an interactive activity in several classes over the course of a term with different combinations of cards. A concept sort could be used both at the beginning of a module to introduce students with the vocabulary, as well as at the end to review concepts covered. It is recommended all games have either a handout with all the concepts in the deck or show the concept list on the overhead screen during gameplay. This is likely to improve the familiarity of students with key concepts from the module.
- ✓ *Peer-to-peer versus Peer-to-mentor:* One positive outcome of this type of activity is it creates a safe space for failure when students play against each other, but some activities need the mentor as an arbitrator to assess correctness or encourage more critical engagement and discussion. For example, one faculty member thought to creatively have students choose a card from the deck and then have students explain how the concept relates to the lecture or seminar in a minute, followed by a more critical discussion of the relationship led by the faculty – they called it 'One-Minute Masters'.

> *"I would shuffle the deck and get the students to randomly pick a card and deliver a one-minute analysis of how they would interpret or describe the word and its association with the subject of the seminar. I would then look to develop their analysis through discussion with the seminar group and how the word translates into the practical realities of the workplace/management. By doing so, I would hope to get them to understand 'critical analysis or evaluation' in that what does it mean to them? However, I would also like to illustrate the different perspectives of a given subject by creating the class discussion, so they can understand that 'interpretation' depends on the lens the subject is being viewed from." – Anonymous Lecturer on how they adapted the cards for their module*

- ✓ *Emphasize Value:* Ensure that students understand how the game or activity will help them in the module and develop their skills. In one module, a student expressed frustration over not understanding how the game would help them in their exam. Hence, the takeaway was that future game facilitators should emphasise beforehand how the subject revision deck activities might contribute towards successful completion of any assessments. Make sure to provide a clear introduction to the game activity, its purpose, intended learning outcomes, and potential benefits with respect to the assessment(s).
- ✓ *Multiple Purposes:* Consider the purpose in choosing the game. For example, these games could either be used as seminar activities to prompt discussion, by students for revision, or for recruitment activities to introduce potential students to key programme subjects.

There is potential for every subject to have its own deck that can be used to complement and enhance the student's understanding of the theories, concepts and vocabulary required. That said, there are limits to this case study approach to games-based learning – namely it is most suited for content that is conceptually focused via vocabulary, theories, etc. Modules with more technical, applied or dynamic content, like mathematics or current events focused modules, may have more limited uses for this approach. These customizable subject-revision cards could still be adapted to these modules, e.g., modules with examples or cases that change every year would not use professionally printed cards, but could have students in groups design and play with their own cards every year as they progress through the module.

Conclusion

Game-based learning is receiving increasing attention world-wide – particularly in the aftermath of the Covid-19 pandemic when higher education in many countries was all online. Despite the growing popularity of digital games, the persistence, flexibility and approachability of analogue games has stood the test of time. Their previously limited use in higher education is an oversight given the growing consensus that in-person playful learning can increase student engagement and understanding. Across higher education, card games have proven to be powerful tools to increase student motivation, improve knowledge retention, encourage teamwork, and even influence attitudes (e.g. towards collaboration) in a positive way (Yu et al. 2025; Joseph et al. 2024). By focusing on subject-based card games, there are two immediate benefits: 1) they can be used in almost any subject, and 2) transitions students beyond the modularization of learning.

The outcome of this case study was the production of high-quality reusable teaching resources for use in multiple business subjects to enhance student learning, as well as six takeaways for future case studies developing customised analogue games for learning. The main advantage of following the approach in this

research is that with a simple design of essentially a deck of vocabulary words and concepts from a subject, multiple games and playful learning activities can be developed for a variety of purposes and learning outcomes. The main limitations of this case study include the relatively small sample size for the student survey and low number of participating subjects. Expanding the scope and scale of this case study could improve the representativeness of the results.

For future research, this type of case study lends itself well to scaling not just to business subjects, but also other topics. For example, this may be particularly apt for engaging international students or local learners where technical vocabulary introduced in subject-specific modules may be more challenging. Research could also address issues around barriers to adoption by faculty, whether students and teachers prefer printouts due to their low cost and ease or professional prints, the potential impact on the student's experience of higher education, and how different game formats and implementation strategies shape student learning outcomes. Furthermore, future case studies could build on methods to co-produce with students the concepts, so the revision decks are adapted over time or investigate how to add more advanced concepts for students that understand the basic vocabulary and want to challenge themselves.

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Appendix: Student Survey Questions

1. Which game did you play?
2. What module and/or subject is the game focused on?
3. What is the name of the staff member leading the exercise?
4. What is your gender?
5. On a scale of 1 to 5, with 5 being the best and 1 being the worst, please rate your overall experience of this game.
6. What was your favourite part of the game? (Write in own answers)
7. What was your least favourite part of the game (if any)? (Write in own answers)
8. How much has your knowledge of the key concepts and terms in the module and/or subject improved after playing the game? (Categories: Quite a lot, A little, Not at all)
9. To what extent did you use these work skills whilst playing the game? (Categories: Quite a lot, A little, Not at all).
    a. Analytical thinking and innovation
    b. Active learning and learning strategies
    c. Complex problem solving
    d. Critical thinking and analysis
    e. Creativity, originality and analysis
    f. Leadership and social influence
    g. Technology use, monitoring and control
    h. Technology design and programming
    i. Resilience, stress tolerance and flexibility
    j. Reasoning, problem solving and ideation
10. What was the MAIN skill used whilst playing the game?
    a. Analytical thinking
    b. Innovation
    c. Active learning and learning strategies
    d. Complex problem solving (ill defined problems such as climate change)
    e. Critical thinking and analysis
    f. Creativity, originality and analysis
    g. Leadership
    h. Social Influence
    i. Technology use, monitoring and control
    j. Technology design and programming
    k. Resilience
    l. Stress tolerance
    m. Flexibility
    n. Reasoning
    o. Problem solving (clearly defined, or tangible, problems)
    p. Ideation (forming of ideas or concepts)
11. In what way did you use the 'main work skill' when playing the game?
12. Can you give an example of how this skill might be used in a business context?
13. Any other feedback on the game?

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