A Pleasure Learning Business with You: A Case Study Testing a Game-Based Framework in Higher Education

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Keywords
Digital game-based learning
Business simulation
Business Education

Abstract

Business education at the tertiary level comprises many sectors and interconnected processes. These dynamics can be challenging to understand without experiencing the complexity first-hand. Many experiments use bespoke simulations that can take time and money to develop. Instead, this paper used an off-the-shelf game called Two Point Hospital. This project aimed to create an opportunity to (1) apply relevance to theory, (2) practice decision-making in a safe space where there is the freedom to fail, and (3) debrief and critically reflect on these decisions. The experiment aimed to test the usefulness and acceptability of game-based learning in a business classroom. This case study involved a small group of Master of Business Administration (MBA) students (N=10) from Regenesys Business School, who were given a survey based on a modified technology acceptance model. The results showed that there is indeed a place for commercial off-the-shelf (COTS) games in business education, with students responding positively to the software and the application of theoretical knowledge. However, there is still room for

improvement regarding implementing game-based learning and creating formative assessments.

Introduction

Business education can be challenging to conceptualise due to the increasingly complex relationships that accompany how finances flow, function and fluctuate in modern society. This complexity is why simulations are a great way to connect theory to practice. Game-based learning can allow learners to understand the context of theories learned in class in a simulated, real-time environment, thus reinforcing the knowledge gained through lectures. By simulating processes, learners can gain a more manifest understanding of these relationships. These instances of digital game-based learning (DGBL) can offer a space for real-time decision-making with instant feedback. Additionally, creating these learning spaces could lead to moments that learners will remember because of the educational and entertainment value gained from their experience. Many game-based approaches also encourage teamwork. This can be particularly beneficial for adult learners who may be working in a team-based environment in their current or future job. However, creating this learning environment is still considered a knowledge gap, so this project was an attempt to push the exploration and implementation of commercially available applications for DGBL purposes.

Bespoke digital games require a heavy investment of resources, from the time necessary for planning the software to the cost of building it. Graphical assets can be especially expensive when developing a game. Therefore, research into the use of COTS games could lead to easier access to higher-quality productions that offer the best of both worlds: aesthetics and functionality. Furthermore, COTS games are available immediately, creating more opportunities to use various applications and lowering the barrier to trying game-based initiatives.

Looking at any DGBL implementation, it is essential to validate that this approach is feasible and accepted by the learners. Therefore, the acceptance of using digital games to improve the curriculum's educational value was a key success factor for this project. The contribution of this paper is (1) to expand our knowledge of DGBL in business education using a COTS game to establish its effectiveness and feasibility in the classroom; (2) to understand the perspectives of the students in a DGBL environment; and (3) to identify the issues that arise from implementing DBGL in business education.

Background

Games in education have been used as a method to enhance the learning experience and promote the development of critical skills because of their ability to generate interest and engagement (Bergin, 1999). Previous research has shown that games can be used to teach a wide range of business concepts, such as accounting (Sugahara & Lau, 2019), marketing (Vos, 2015), and enterprise resource planning (Beranič & Heričko, 2022). This adoption of gameful approaches is due to the increasing recognition of the potential benefits of using video games as an educational tool - since video games can provide a dynamic and engaging platform for learners to acquire knowledge. Another benefit of using video games in business education is the ability to simulate real-world scenarios. This allows adult learners to apply their knowledge and skills in a safe and controlled environment.

Andragogy

Adult learners have unique characteristics that must be addressed to conduct effective classes. The term andragogy was coined to separate our educational views away from the pedagogical perspectives we have for young learners (Forrest & Peterson, 2006). Although these paradigms want to be considered uniquely different, they share many similarities to the point where it can be difficult to judge whether andragogy should be considered at all (Elias, 1979). However, as the debate rages on, there are a few characteristics that are true for adult learners. For example, adult learners often have responsibilities outside of education, such as jobs or families to take care of. This means the value of education is in its return on their time investment. Adults will be critical of their learning, which means it is important to create meaningful, enjoyable learning experiences that add value. The following criteria were considered during the conception of this project and the selection of the game:

- The game must allow a student's decisions to impact the outcome of a situation, thus giving feedback. Metrics in the game should also encourage self-awareness of decisions leading to the conditions being experienced by the learners.
- Class material should be immediately applicable to the scenario created in the game, thus creating relevance to the game.
- To simulate a business environment, each individual in a team must be assigned roles and responsibilities related to jobs in the real world.
- There must be opportunities for different strategies to be implemented within the given timeframe so that there is some freedom to make bad decisions.

Therefore, experiential learning is the main focus of this project, and the DGBL application needs to be able to deliver such an environment. This is especially important in a collaborative setting where students can use their prior knowledge and experience from the workplace to create peer-learning opportunities. The inclusion of roles adds to the importance of each person being an essential component in the running of a business.

Game-based education

DGBL in business education generally revolves around simulations to expose learners to scenarios in a more interactive way. These simulations are built to provide authentic situations in which learners can immerse themselves and test or develop skills. This creates an opportunity to become more comfortable with the subject matter as well. Simulations can also provide meaningful experiences that can be more memorable than traditional class activities.

An example of a popular business simulation is Capitalism Lab (Enlight Software, 2012), which according to their website, has been used by universities to simulate decision-making as an entrepreneur. Enlight Software also provides a downloadable guide for educators to explain how the game links to theory. However, an issue with Capitalism Lab is that it is an incredibly complex simulation requiring extensive onboarding. If educators or learners are unfamiliar with running serious, intricate simulations, the complexity of learning to play may deter efforts to implement such strategies (Egenfeldt-Nielsen, 2004). Therefore, a more accessible and entertaining approach could open the door to the broader adoption of DGBL in classes.

Selecting Two Point Hospital

The game used in this acceptance and feasibility study was Two Point Hospital (TPH) (Two Point Studios, 2018). The game was chosen for its ability to create a way for students to experience overseeing a service supply chain – which was the topic of the lesson. Additionally, the game design features, although simple compared to simulations like Capitalism Lab, were complex enough to provide metrics for assessment. There were several reasons for choosing TPH, and the main points will be detailed below:

Literature Review

According to research, narratives and themes are not only frequently found in educational implementations of DGBL, but they are also highly impactful for the learning experience (Govender & Arnedo-Moreno, 2021; Caminotti & Gray, 2012). With TPH, it was possible to create a narrative with the students and set limitations using a custom map. The story, in this

case, revolved around the students taking up roles in a newly planned hospital. For this study, we assigned the roles such as accountant, project manager, human resources manager, and operations. The narrative gave purpose to their involvement in the game world which extended into their formative assessment. In this simulation, the students created the narrative through their decisions and needed to document the effects of their actions. This created an opportunity for the teams to think about what they wanted to achieve and how they could apply business theories to their strategies.

Humour

TPH is not a serious simulation; it is a parody. The hospital in the game treats fictional diseases with outrageous treatments, such as pandemic patients (people with pans stuck to their heads) being treated by using a magnet on a crane called an Extract-a-Pan. The effect of humour on learning has been documented in higher education. Research has shown that humour can be beneficial for a plethora of reasons, such as reducing anxiety, encouraging retention of knowledge by reinforcing class material and increasing curiosity and attention during the lesson (Bakar & Kumar, 2019; Powell & Andresen, 1985).

Feedback

Feedback in TPH comes from a few sources. There are audio and visual elements, regular updates, and metrics.

Audio and visual feedback

Each character can be inspected for more information, but situational feedback is provided through small icons so that you do not have to click through each patient or employee individually. These icons can show different types of information, such as not having enough bathrooms, boredom, long queues, etc. (see Figure 1).

Figure 1: Screenshot showing an example of visual feedback with queue length indicator and patient status

1. The hospital announcer in the game will also give information about the public address system but in a more sarcastic tone. The audio feedback is less frequent than the visual cues and was not utilised during the project since the volume was lowered to encourage discussion.

2. Regular updates

The hospital assistant often appears with status updates and hints. These updates can help guide the students if they feel lost. This mechanic is also known as signposting because it shifts a player's attention towards game objectives. Signposting is a very important element for lowering anxiety when using a new application since the build-up of uncertainty of what to do next can lead to frustration (To et al., 2016).

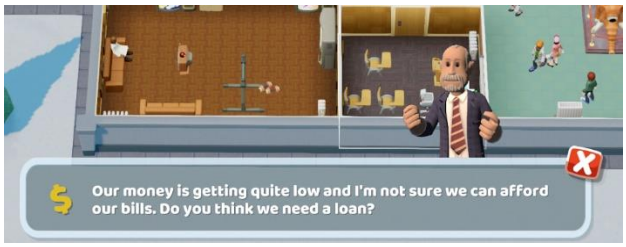

Figure 2: Screenshot of the regular updates from the hospital assistant

3. Easy-to-understand metrics.

Finally, the game has metrics and logs that are easy to understand even if you are not business-savvy (see Figure 3). The main metrics consist of a financial report, patient overview and staff overview. The metrics are mostly presented as graphs for a quick inspection. However, there are also detailed logs that report everything happening in the hospital as they occur. The logs can be quite overwhelming, but they can be useful for determining whether new initiatives are working.

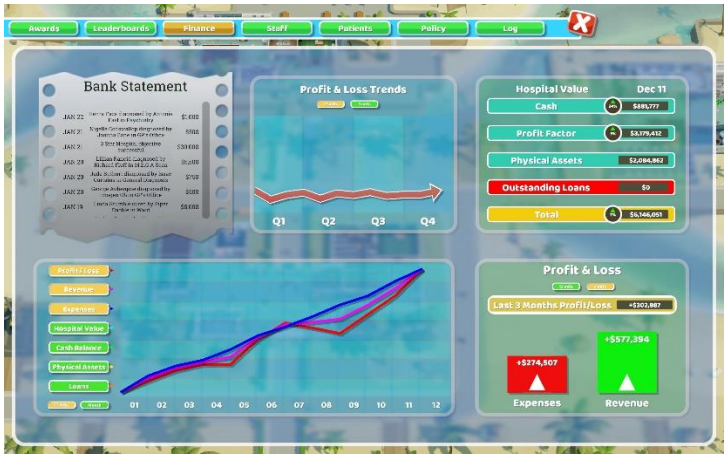

Figure 3: Screenshot of finance metrics

4. Simulation features and roleplay

A business simulation would not be complete without the ability to control variables. TPH offers several manipulatable aspects. A few of the important variables will be listed below, along with the role that was assigned to them when planning the use of the game. The roles were very important because there needed to be communication between the roles to create a collaborative narrative.

1. Salaries, hiring, firing, skills training, promotions, raises, roles and responsibilities, workplace happiness, etc., were assigned to the human resources manager or people operations leader. However, the salary changes and hiring prices had to be discussed with the finance department. The operations manager or general manager was also involved in discussions around hiring and firing individuals and establishing the responsibilities of employees.
2. Pricing of procedures, purchasing items and equipment, monitoring income, advising on profitability, etc., were handled by the finance department or accountant. Again, there would be communication between human resources and finance regarding aspects like staff needing more entertainment in the breakroom or outsourcing help to train staff instead of having it done internally. The operations manager or general manager might want to purchase more toilets or vending machines to keep everyone happy, but these will need to fit within the budget created by the finance department.
3. The operations manager or general manager will need to make sure equipment is maintained, the hospital is clean and up to standard, and the queues are not too long. This role was heavily involved in customer satisfaction. The manager will also collect data and report to the project manager regarding the current status of the hospital. The managers can discuss hospital development based on the data presented.

4. Finally, the project manager or director of the hospital will need to take charge of and implement the decided strategy. This role does not watch the hospital directly from the ground floor but forms a core part of coordination between departments and ensuring the decisions made align with the strategies previously discussed. They will monitor all aspects of the hospital, assign tasks to other members, and decide on hospital policies. Since the other departments will be actioning tasks, the project manager is tasked with observing changes, noticing issues, and formulating plans to help the project succeed.

It was determined that the complex relationships that are necessary to manage a service supply chain could be demonstrated on a small scale using these roles.

Methodology

In this section, the steps taken to complete the project will be described in full. The process detailed below aims to create a framework that will help others to implement DGBL purposefully in their classrooms.

Sample group and ethical considerations

The participants for this study were a group of ten MBA students from Regenesys Business School in Sandton, South Africa. Before the investigation, ethical clearance was requested and approved by the ethics committee and head of research at Regenesys Business School. This clearance included permission to access their students as well as the approval of the consent form proposed. On the day of the experiment, the project was explained to the students, and they were taken through the consent process along with an explanation of their rights. Although the project took place during a class session, providing data about the experience was voluntary and was created to comply with GDPR requirements.

Instruments

To survey for acceptability, this project used a combination of the Technology Acceptance Model (TAM) and User Engagement Scale (UES) items to ask participants about their experience. The TAM is especially suited to testing acceptance before investing large amounts of resources into a project since it looks at how a system is perceived in terms of usefulness and acceptance (Davis, 1989). The UES was used to augment the TAM to relay the experience of using this particular software (O'Brien et al., 2018). Since the engagement factor is related to a user's investment into a system, this relates to the pedagogical principle that adult learners

need to find value in an approach for it to be accepted. Figure 4 contains the list of items and variables that were tested in this study.

Adapted from Paul's TAM	
Perceived ease of use (PE)	E1: I find the system easy to use. E2: Learning how to use the system is easy for me. E3: It is easy to become skilful at using the system.
Perceived usefulness (PU)	U1: The system would improve learning performance. U2: The system would increase academic productivity. U3: The system could make it easier to study course content.
Attitude (AT)	A1: Studying through the system is a good idea. A2: Studying through the system is a wise idea. A3: I feel positive toward the game-based system.
Self-efficacy (SE)	S1: I feel confident finding information in the system. S2: I have the necessary skills for using the system.
Subjective norm (SN)	N1: What game-based learning stands for is important for me as an educational expert. N2: I like using the system based on the similarity of my values and societal values underlying its use.
Adapted from O'Brien's refined UES	
Focused attention (FA)	F1: I lost myself in this experience. F2: The time I spent using the system just slipped away. F3: I was absorbed in this experience.
Aesthetic appeal (AE)	T1: This system was attractive. T2: This system was aesthetically appealing. T3: This system appealed to my senses.
Reward factor (RW)	R1: Using the system was worthwhile. R2: My experience was rewarding. R3: The content of the system incited my curiosity.

Figure 4: Item descriptions for TAM & UES questionnaire (Govender & Arnedo-Moreno, 2022)

Procedure framework

The project was planned according to the framework described in this section, which could be reproduced with other applications. The aim was to create a simple recipe for adding off-the-shelf DGBL activities to a class. Educators are experts in their fields; however, besides reading up on the latest research, they are often engaged in a myriad of tasks such as teaching, publishing, grading, and supervising, leaving very little time for the higher education faculty to "figure out" new teaching methods. So, the hope was that this step-by-step approach would encourage more educators to try and use DGBL.

Step 0 - Scenario preparation

This is an optional step for moddable games. For example, games that allow you to generate custom maps that have a scenario pre-built to illustrate the cause and effect of a particular theory. TPH allows for the creation of maps that can be saved at a point in time, such as a

running hospital that has loaned out the maximum amount available and is unable to pay it back because it cannot turn a profit.

Step 1 - Group assignment and game preparation

Split the class into groups depending on the number of roles and ask each group to assign one person to be the game controller. The game controller will ideally have a good level of computer literacy and will need to install or stream the game on their device. Another benefit of COTS games like TPH is that they are available on a variety of platforms (https://www.twopointhospital.com/en). If downloading and installing the game, the installation can take time depending on the internet speed and device limitations, so it is important to get it started right away - or in advance, if possible.

Step 2 - Educational content delivery

Teach the theory needed for the simulation. This project aimed to provide a practical look at the service supply chain. The educator went through the business lesson as usual before moving on to the onboarding session. During this class, they were introduced to Ishikawa diagrams which would form part of their group strategy and assessment.

Step 3 - Onboarding

The onboarding or tutorial step is an important part of overcoming the anxiety of using a new software and making the game easier to play (look for uncertainty citation). This step is also necessary for students to understand the functions that the game has to offer. TPH's features were limited due to the short time that was allocated for the whole activity, so the onboarding process was completed quite quickly. This also worked in the favour of the project because the students were able to spend more time on their strategy. Onboarding must also include the task information, assessment criteria, rewards, time limits, or any other information related to the activity.

Step 4 - Play and learn.

Now that the students are properly prepared for the activity, they can be left to discuss plans. For this case study, students were given a short time to process all the information given during the onboarding step and could use their time to create a business strategy. A considerable amount of peer learning took place during this time. Additionally, the competitive nature of the students started to come through with students trying to overhear what is being discussed by their opponents. During this step, the educator facilitates the session. Students often asked questions about their decisions and how they would work in real-life situations. The game session was limited to four years of in-game time which is roughly 60 minutes at two times the speed. If they finished the four years before the 60-minute timer, they had to pause the game

and take their screenshots of their metrics. If they were not able to finish all four years, they had to stop once the 60-minute timer went off.

Step 5 - Debrief

Debriefing is a learning experience through reflection on the learning journey, an activity that is beneficial in other game-based implementations in business education, such as Lew and Saville's (2021) use of Monopoly to teach investment. Debriefing was also helpful for students in understanding the mechanics behind decisions in the service supply chain. The educator facilitated the debrief by asking the students about their experience, providing insight from their observations during the session and reiterating certain theories that were overlooked.

Step 6 - Assessment

The assessment for this case study was based on the game session. The first part was group work which comprised questions about their roles and critical decisions taken during the class while playing TPH. There was also space for writing down the theories implemented and the results. Finally, the group needed to attach a screenshot of their metrics from the game. These metrics were only used for the hospital competition element. The prize for first place was a badge that could be displayed on the learning management system and shared on social media. The second part was individual work and comprised an experiential essay that needed to explain the details of what went right and wrong in their hospital. These essays needed to include all the challenges that were faced and how they would do things differently. Two interesting features came from this approach. First, the students were assigned different roles, so their essays would be unique to them even in the group. Secondly, the criteria for grading was based on their reflection on what happened even if their hospital failed. For example, analysing how they could have done better in the role assigned to them or obstacles they faced in the decision-making process because of their role. This way, the students grow from their experience regardless of the outcome of their game.

Although out-of-scope for this project, this type of assessment could be a useful approach for assessing learners in an era of generative artificial intelligence. Although the theories are not un-googleable, students will be producing unique experiences during these sessions that could be identified when grading papers.

Issues and challenges

The first problem was that the items on the questionnaire were not clearly understood. The explanation of the survey was brief at the end of the session, and the students were distracted

due to the excitement of playing the game. This led to some confusion around the items when asked during follow-up conversations. Additionally, the population contained second and foreign-language English speakers who interpreted some of the questions incorrectly.

The next issue was the length of the onboarding. Participants mentioned that they would have liked more time to get used to the application. This case study was designated to a single lecture slot, but it would have been beneficial to have another slot (or spread over two days) to give students additional time to practice and debrief after the game.

Finally, the projector that was present in the classroom had a dim bulb and created an image that was challenging to interpret. This created two major problems for the classroom flow. First, the onboarding part of the plan became more difficult. Most of the students could not follow the instructions visually, which made the session ineffective for its purpose. Second, the lack of onboarding led to the primary researcher needing to break the immersion that was necessary for the experiment's outcome. All of these issues will be addressed with better planning in the next iteration of this project.

Results and discussion

Table 1: Questionnaire data

Category	Item	Minimum	Mean (μ)	Std dev (σ)	Alpha (α)	Median
PE	E1 E2 E3	3 3 3	4.125 4.375 4.000	0.835 0.916 0.756		4 5 4
	Cat. total	3	4.167	0.799	0.885	4
PU	U1 U2 U3	2 3 3	4.250 4.375 4.125	1.165 0.744 0.835		5 4.5 4
	Cat. total	2	4.250	0.878	0.840	5
AT	A1 A2 A3	2 3 3	4.250 4.375 4.625	1.035 0.916 0.744		4.5 5 5
	Cat. total	2	4.417	0.862	0.931	5
SE	S1 S2	2 2	4.125 3.750	1.126 1.165		4.5 4
	Cat. total	2	3.938	1.088	0.946	4
SN	N1 N2	3 2	4.250 3.875	0.886 0.991		4.5 4
	Cat. total	2	4.063	0.899	0.918	4
FA	F1 F2 F3	1 1 3	3.750 4.125 4.250	1.488 1.458 0.886		4 5 4.5
	Cat. total	1	4.042	1.241	0.866	4.5
AE	T1 T2 T3	4 3 3	4.625 4.250 4.125	0.518 0.886 0.835		5 4.5 4
	Cat. total	3	4.333	0.745	0.844	4.5
RW	R1 R2 R3	3 3 3	4.625 4.375 4.500	0.744 0.916 0.756		5 5 5
	Cat. total	3	4.500	0.764	0.855	5
Overall data		1	4.233	0.934	Good	5

Of the ten participants, eight answered the questionnaire without skipping any of the questions. Although the population was small (N=8), some interesting results were extracted from the survey. Table 1 contains the summary of the gathered data.

The overall mean (μ) value of 4.233 out of 5 and median value of 5 describe a very positive experience by the participants, even with the challenges faced during the study. With a standard deviation (σ) less than 1, the data points were grouped closely around the mean - reinforcing the positive result being moderately consistent amongst the survey responses.

Cronbach's alpha (α) was used to evaluate the internal consistency of the given categories. α is a measure of agreement within a given category and indicates whether the items show correlation. If this value is high, the category is attributed to one-dimensionality, which is an important characteristic in a survey because it shows that the items are correlated (Tavakol & Dennick, 2011). Every category had an α value above 0.8 on a scale of -1 to 1, which indicates good to excellent internal consistency.

Although the game had multiple working parts, the participants did not find the game overly difficult to use. However, the value for PE was likely to be affected by the lack of proper onboarding, being one of the three categories that scored a median value of 4 out of 5.

PU, AT, and FA had outliers in the data. With means of 4.25, 4.417 and 4.042 respectively, the outlying responses were interesting to analyse. FA, especially, had the highest σ at 1.241, which means there was less agreement in this category. It is easier to explain the lower score in FA than PU since the immersion aspect was broken several times to help with game mechanics that could not be fully explained during the onboarding due to technical problems. By extension, this also explains the lowest score being found in SE since these deal with being able to take control of the game.

AT received the second-highest mean value, but one participant was not able to adopt the lusory attitude (or willingness to play) necessary to enjoy the session. Upon enquiry, it was discovered that this was due to an external factor. The participant was a foreign student and not a native English speaker, so they struggled to understand the onboarding as well as their team members. This led to a worse player experience because they could neither interact with the game with confidence nor collaborate well in their group.

PU's outlying 2 was found on the item asking if the game will improve learning performance; however, interestingly, the same participant gave the other two items in this category 4 out of 5. Since PU's α is over 0.8, the items should have been quite consistent with the category, which makes it challenging to analyse the reason for this low score.

The minimum value of 2 in SN was not an outlier. A few of the participants mentioned that they did not fully understand the meaning of the category or how it applied to the game. This confusion in meaning led to a lower score.

RW received the highest rating amongst the categories with a μ of 4.5. This means the participants found the experiment to be a rewarding experience; thus, the implementation, although rough, succeeded in creating a memorable moment.

The causes of most of the low values could be linked back to the issues faced during the experiment, especially the ineffective onboarding. Even with the language issue, an effective, visual onboarding could have mitigated a lot of the confusion. However, this was a good experience to learn about the pitfalls of using such an approach. The failure to show the students how the game works visually and take them through the features led to a higher level of uncertainty when the activity took place. Although the students still enjoyed themselves, there was a constant break in flow from being unable to figure out how to do certain actions on the game or needing guidance on where to find things.

Overall, the results were positive, and the game provided an enjoyable experience in the classroom. Some elements need to be worked on to improve the next implementation, but the aim of the project was fulfilled. The positive response to the useability variable of the TPH experiment provides some evidence that it was complex enough to apply theoretical concepts and, at the same time, show complex relationships in real-time (PU).

Conclusion

Using commercially available video games in higher education can provide a dynamic and engaging platform for adult learners to acquire knowledge and develop skills related to business concepts and practices. Video games can simulate real-world scenarios, provide immediate feedback, and promote competition and collaboration. Furthermore, video games can be a helpful tool for developing problem-solving, decision-making, and critical-thinking skills that are essential for success in the business world. The case study findings show that there is a place for gameful approaches because it adds value to the learning experience, which is highly relevant to adult learners. While educational content can be adapted into assessments, this project was not aimed specifically at assessment and found that there is more to be done in this area for the next implementation. There was a good mix of collaboration and healthy competition throughout this project. It was an amazing experience for educators and students, but further research is needed to generate more data on the actual effectiveness of such a method, especially with larger groups of students.

Recommendations

Assessments are changing rapidly with the public accessibility of natural language processors that harness powerful artificial intelligence. Gameful strategies could provide hints to advancing our assessment types to deal with the new norm of accessibility to information. For example, the assessment process followed during this process is not as googleable or AI-friendly as a multiple-choice question or traditional essay topic. These types of assessments will become a necessary part of education in the near future.

Another aspect, the concept of aesthetics affecting immersion, arose from the semi-structured interviews. Future experiments could try to answer the question of "how much do the visual and audio components of a digital game affect learning?" and whether it is necessary to invest more into the graphical and sound assets when choosing or creating games. Most simulations focus on the educational content since designing and building each game component takes time. So, compromising on one element means having the time and monetary budget to work on more critical elements. In business simulations, aesthetics is often sacrificed for functionality and realism. Purely from an asset point of view, TPH was developed by a large studio that can produce high-quality graphical and sound elements - but it is not a realistic simulation when compared to other business simulations. However, bespoke simulations ordered or created for a specific purpose could incur more costs than initially budgeted if these components are also built to the same level. So, the value of such elements should be investigated to gauge whether a less intensive simulation with more appeal and entertainment value would be worth budgeting for in custom games.

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