Loading… The Journal of the Canadian Game Studies Association
Vol 17(27): 1-34
http://loading.gamestudies.ca

Moloch's Gauntlet: New Undergraduate Pedagogical Perspectives in Minecraft

Angelica Calcagnile
Concordia University
angelica.calcagnile@mail.concordia.ca

Nat Torre
Concordia University
ctorre3838@gmail.com

Andrew Rochon
Concordia University
andrewrochon@live.com

Theodore Fox
Concordia University
theodore@theodorefox.com

Abstract

As undergraduate students turned research assistants, building Moloch's Gauntlet, an in-game escape room, became a lived experiment in modded Minecraft as a pedagogical tool. Our project explores three ideas: 1) how dismantling the game's representational aesthetics links it to the wider body of knowledge that functions as an alternate academic space, 2) how selectively concealing and revealing the game's mechanisms leads to procedural elaboration, inviting participation in the creative process, and 3) that modded Minecraft functions as an open platform that makes the iterative game design process accessible, teaching design through play without the barrier of complex computer science foundations. Our own experience, first as students and then as undergraduate student-researchers, suggests that engaging students with techniques that move beyond familiar call-and-response, problem-and-solution approaches, can result in a transformative outcome for students and educators alike.

Author Keywords

Minecraft, videogame, pedagogy, escape room, play, education, games

Moloch's Gauntlet: New Undergraduate Pedagogical Perspectives in Minecraft

What if instead of simply playing a video game as part of a university class, a set of students elected to reframe the game? What if by playing with a game instead of within a game a pedagogical methodology was formed? What if university students learning within that paradigm went on to build new frameworks within that framework? And what if the

exploration of those new frameworks leads to further opportunities for experimentation and learning? Our own experience, first as students and then as undergraduate student-researchers, suggests that engaging students with techniques that move beyond familiar call-and-response, problem-and-solution approaches, can result in a transformative outcome for students and educators alike. Inviting student learning through aesthetic experimentation, revealing construction processes, and iterative design is an empowering strategy for using games in the classroom. Throughout this paper, we describe this ongoing, necessarily incomplete process as "reframing".

The reframing of agency in games from "representing choice or freedom" (Tanenbaum, 2009, p. 1) to "commitment to meaning" (Tanenbaum, 2009, p. 1) is material to our methodology. While a game may provide limited options in terms of interaction, these limitations do not necessarily strip the player of agency but rather shift the notion to one in which the "player and designer are engaged in a conversation with each other via the game story" (Tanenbaum, 2009, p. 7). In other words, the game becomes the site of a dialectic in which the player commits to a deeper engagement through the personal production of meaning. Our project demonstrates that agency, as established by playing with the affordances and limitations of video games, takes on deeper meaning when extended outside the confines of the game's available choices and symbology into the classroom and beyond. Reframing agency against the pedagogical potential of video games enabled us to move from students to researchers; we believe that "richer, more meaningful experiences" (Tanenbaum, 2009, p. 8) are possible when video games in education are reframed from their traditional scope as a medium for distributing and testing content, to sites in which students can seek meaningful expression as they engage with course material.

We began reframing our sense of our own work as a group a little more than two years before writing this paper. With COVID-19 restrictions fully in place at our Montreal-based Concordia University in January 2021, the four authors enrolled in a class, *Video Games and/as Theory: Minecraft and Modernity Edition*, that we would soon discover would be taught entirely within Minecraft, the second most popular video game of all time (Callaghan, 2016). Our journey as students followed a trajectory that our professors, Darren Wershler and Bart Simon (2021), call the *allegorical build,* in which in-game experiences are used to think critically about non-game material and topics. This approach "seeks to emphasize the learner's active role in forging a relationship between representation (in a video game for instance) and some aspect of the world" (2021, p. 199), "shifting the responsibility for learning from the teacher and educational designer to the students, who may, if they so choose, make their play educational (or not)" (2021, p. 201).

During *Video Games and/as Theory: Minecraft and Modernity Edition*, we spent our class hours on the course's custom Minecraft server, and in the Discord channel synchronized to the server's chat. All lectures for the course were recorded as half-hour podcasts and were available along with the course readings through the class's content management system. The inverted or "flipped" classroom structure, upon which the course relied, asks students to engage with the course material on their own time, and then bring that knowledge to their synchronous meetings with classmates and professors. As such, within the confines of class time, the professor is no longer necessarily the central figure. Students work together to develop their understanding and interest. Opportunities to provide peer support and to step into leadership roles with their classmates develop through interaction and are critical to the

success of the class's structure. This was a significant component of our participation in the original class, where students often stepped into these roles within their working groups and the larger class as a whole.

Our frame shifted again when we returned to this project in fall 2021, this time as paid undergraduate Research Assistants observing a new class of students. We soon identified some key differences between our experiences and theirs. The cross-team collaboration and peer support that we had seen in our iteration of the class was not as discernible among the new set of students. Whereas the collective, communicative culture we experienced deepened our pedagogical experience, reinforcing the flipped class structure and allegorical learning, we observed that the students in this new class seemed more individualistic and outcome-focused. The wider context of a post-lockdown return to campus likely plays into that; commuting eats into students' free time and a return to in-person activities brings with it reduced time for virtual in-game engagement. In contrast, during our experience of the class, students' full course loads were virtual and it is a safe assumption that much of their social lives (and in some cases, their work lives) happened within the confines of the same screen. As we thought about the differences between the class we had taken and the one we were observing, we wondered: could we help to create an in-game experience that would harness the class material and lore[1] while also promoting relationship-building and cross-team collaboration?

Our attempt at creating a collaborative learning experience for the students, through our own take on the allegorical build, led us to further consideration of *Minecraft*'s potential as a pedagogical tool, but in the context of peer learning. This exploration continues over the course of this paper, in which we argue that dismantling the game's representational aesthetics through procedural elaboration linked to avant-garde artistic practices opens the possibility of other imagined educational spaces; that reframing—selectively concealing and revealing the game's mechanisms—allows student-players to visualise the creative process and its collaborative iterations in ways that are richer than those that result from a focus on a game's symbolic content;[2] and finally, that modded *Minecraft* functions as an open platform that makes the iterative game design process accessible, teaching design through play without the barrier of complex computer science foundations.

In the Minecraft & Modernity class experience, collaborative construction projects lie at the heart of the students' pedagogical journey. In keeping with the style of collaboration we already knew through our earlier experience of the class, we chose to construct something together. To build in response to the conditions we were observing was an extension of our experience of the class, and the skills we leveraged as students in turn informed our process as researchers.

Having gone through the course ourselves, we were deeply engaged with the idea of extending its materials and message into our building project. In order to take advantage of the affordances of problem-based learning, we built an escape room we named "Moloch's

[1] The course uses light storytelling devices to build narrative structure around the in-game requirements. Instructors also share information and anecdotes designed to deepen student interest.
[2] This process of learning and communication via investigation of the game's mechanics is common to *Minecraft* play and is what our colleague, Nic Watson (2017), has termed "procedural elaboration".

Gauntlet". The escape room provides players with an "ill-structured problem", where there may only be one solution, but the path to the solution requires group experimentation. This encourages students to take initiative as a group and to learn how to communicate and work collaboratively (Pearcy, 2019, p. 307). We used the methods and techniques of the class construction to inform the nature of the experience we sought to create.

Expanding on the class's study of modernity's history and culture, we focused our escape room around Moloch, a popular allegorical figure in modern literature and culture that the teaching team had integrated into the server world.[3] In building "Moloch's Gauntlet", our focus on conveying the experience of modernity through the medium of a Minecraft escape room led to us reframing our awareness of the class's pedagogy, which we hope can be conveyed to students in future iterations of the class. By building Moloch's Gauntlet we created an escape room, while also escaping from our own notions of what an undergraduate classroom experience was "supposed" to be, and in doing so, reframed what we imagined to be possible in an undergraduate degree.

Breaking the grid: Academics and aesthetics

Could the "Minecraftiness" of the game be dismantled with limited intervention? This question guided the aesthetic direction of our escape room project. By "Minecraftiness" we mean not just the game's visual aesthetic, but its procedural logic, which like in many games is roughly representational and based on accumulation. Players acquire in-game resources and assemble them into tools or structures that allow the player to survive. The playspace of Minecraft is a landscape built from cubic blocks of identical dimensions; each block face is textured with a 16 by 16-pixel pattern denoting what kind of material the block represents (dirt, stone, ice, iron, etc.—see Figure 1). This texture indicates the physical properties of the block: whether it is affected by gravity, what tool should be used to harvest or "mine" it, and what sorts of crafts can be produced from it.

We wanted to know if we could create an experience that would reframe the student-players' expected perception of the game by defamiliarizing this representational and accumulative logic. Drawing inspiration from modern avant-garde artists, we set out to make a structure using colours, textures and tones that were radically different from Minecraft's default banal parsable palette (Figure 2). In "Art as Technique", Victor Shklovsky (2004) writes "[a]rt removes objects from the automatism of perception" (p. 16). *Minecraft*'s visual language, though fundamentally restricted to 16 x 16-pixel blocks, soon fades into the player's habitual experience of the game. By introducing new textures, we disrupted the relationship between a

[3] The biblical Moloch is deployed as an allegory for sacrificial demand throughout the modern age, notably by Karl Marx (1867/1887) as a symbol for capital, in Fritz Lang's (1927) *Metropolis* and Allen Ginsberg's (1959) *Howl* as a symbol of industrial hunger for the bodies of workers, and more recently in Garry Wills' (2012) critique of gun violence "Our Moloch". In the context of the class, various monuments modelled after the demonic Moloch furnace from Metropolis were placed in the game world, demanding that teams feed it resources or fulfil tasks. In the early weeks of the class, these demands served as a tutorial, in later weeks, teaching staff used them as a way of steering team participation through rewards and punishments.

block's visual and functional properties, allowing the student player's journey through our escape room to feel strangely unlike their regular roughly mimetic *Minecraft* world, opening space for an experience of modern defamiliarization to take its place. We inserted elements designed to inspire awe and evoke the sublime, using light and shadow to create environments that are decidedly "not Minecraft". These moments serve to seesaw the player between the security of representational *Minecraft*, and feelings of visual displacement, in much the same way as an 18th-century farm hand might have felt seeing a steam engine for the first time.

Figure 1

A typical Minecraft grass block (Fandom, 2022)

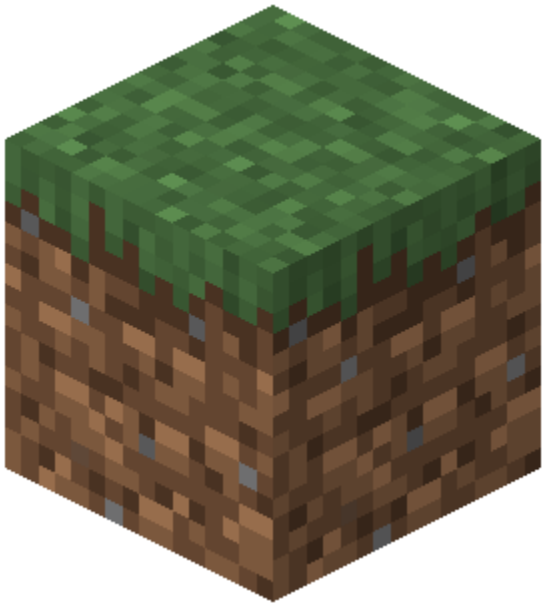


Figure 2

A scene typical of the Minecraft base game, featuring a player's starter hut, and a wild pig and sheep

Note. Original screenshot.

Above all, *Minecraft* is a game about the thoroughly modern logic of the grid. As Wershler and Simon (2018) put it:

> . . . in modernity and beyond the grid is very powerful: it is the condition of possibility for the integration of aesthetics, governmentality, and computational logic. . . While Minecraft might appear to be a game about blocks, its significance as a modern allegory derives from the fact that it is a game about what makes the idea of blocks possible. In other words, it is a game about grids and what they contain: cells (the smallest unit of construction). . . Unless a player is running a mod that erases or obfuscates them, there are always faintly visible gridlines in the Minecraft display, indicating where the contents of one cell end and those of another begin. (p. 290-295)

Reliant as they are on "repetition of the familiar and a grounding in an affirmation of the everyday" (Binkley, 2000, p. 134), *Minecraft*'s visual conventions are resolutely kitsch representations of the physical world: adorable cuddly animals, giant mushrooms, cozy villages and so on. Crucially, kitsch functions as a "general corrective to a general modern problem, that of existential and personal disembeddedness, loss of assurance in the continuity of life and one's place in the world," (Binkley, 2000, p. 149). Given the course's central goal of allowing students to understand the seismic shifts of modernity through allegorical in-game experiences, creating environments that were completely alien to the canonical look of *Minecraft* would mimic the disembeddedness of modernity that kitsch resists.

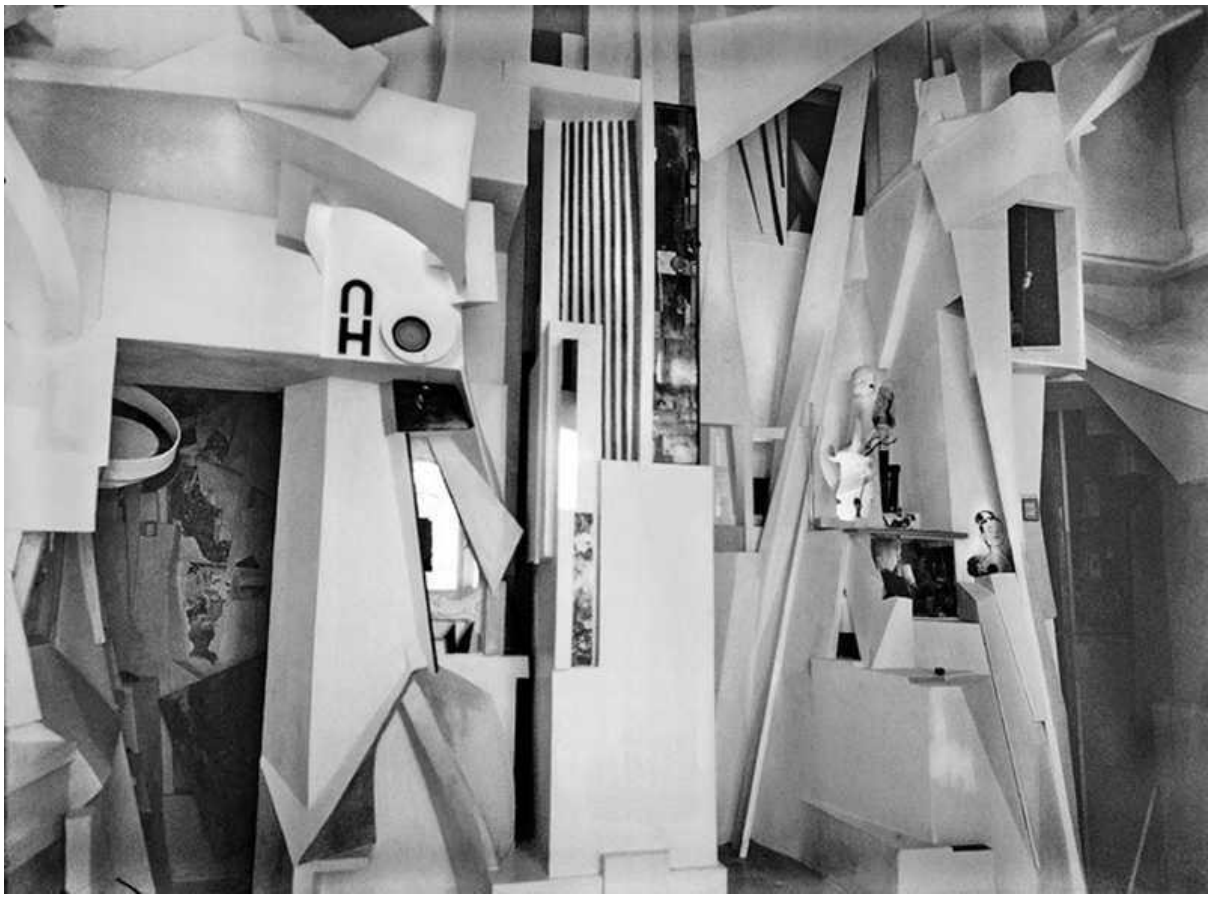
As we explored, we realized we might be in danger of kitsching the avant-garde references we turned to in this work. Our goal wasn't simple mimesis, but to mine the past for imagined futures that might remain "effective in the virtual" (Fisher, 2014, p. 37). This aesthetic territory is hauntological: it signals "a refusal to give up on a desire for the future" (Fisher, 2014, p. 39) and embodies the "agency of the virtual" (Fisher, 2014, p. 39). Here again we see agency as a commitment to meaning, which can exist "even when there are no strategic choices available" (Tanenbaum, 2009, p. 7), or when the "futures that popular modernism trained us to expect … never materialised" (Fisher, 2014, p. 42). Challenging established *Minecraft* forms with avant-garde art is resistance to the framework of the game; similarly, our process plays within and against the established frame of undergraduate university education. We wanted to know: could we build something that would challenge this logic of predictable, reassuring kitsch that fundamentally underpins most video game aesthetics, including those of *Minecraft*?

Our limited time and relative lack of technical expertise meant that programming our own custom blocks and shapes was not feasible, but we found a much more immediate solution. After a YouTube video about custom *Minecraft* maps was posted to a shared Discord server (Jeracraft, 2020), we became fascinated with the potential of such maps and wondered whether they could be used to give the appearance of breaking past the confines of the square and cube, without literally doing so. Through this technique, breaking through the confines of the block and the grid became attainable. The video shows how maps can be used to create "void rooms", in which the game's grid seems to disappear and players are left in rooms seemingly devoid of limits and structure. We realized that we could go further with this technique, reintroducing "false" grids to further dismantle the game's geometry. Custom blocks would allow for moving toward shapes beyond the cube. We considered building Kurt Schwitter's Merzbau, a chaotic assemblage of jagged shapes and shards (Figure 3). However,

we realized that creating the angular shapes it required from scratch was too ambitious for the scope of the project. In order to successfully break the grid, we needed to start with something a little closer to it.

Figure 3

The Hanover Merzbau by Kurt Schwitter, 1933 (Orchard, 2007)



The work of Vienna-based Italian artist Esther Stocker, whose installations play with the intersection of strict geometric forms and their containing spaces, was the departure point for this element of the project. Specifically, her installation for AR/GE Kunst Galerie Museum Bozen and its block-like interior volumes demonstrates both an adherence to the grid, and its dismantling of it, a distillation of how we used maps to undermine *Minecraft*'s own unyielding grid (Figure 4).

Figure 4

Photo from the installation at AR/GE Kunst Galerie Museum, Bozen, 2004 (Stocker, 2004)

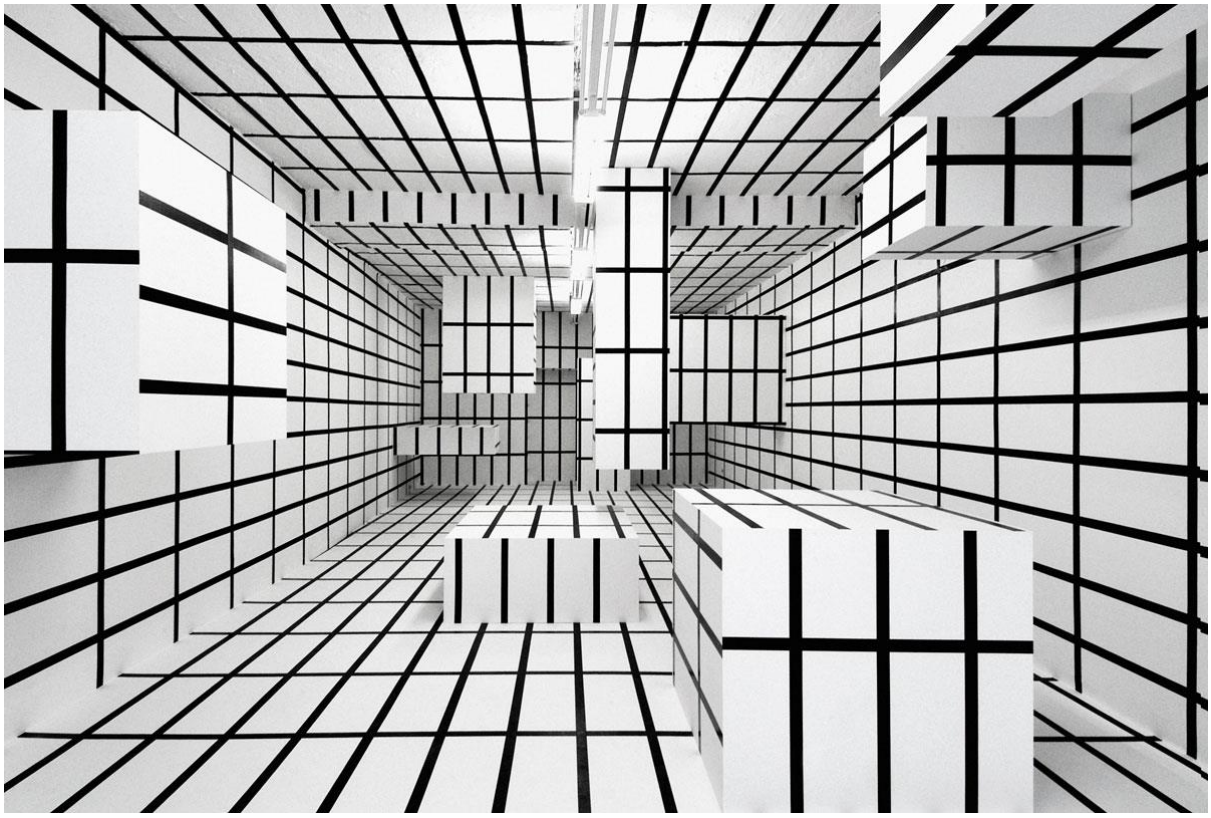
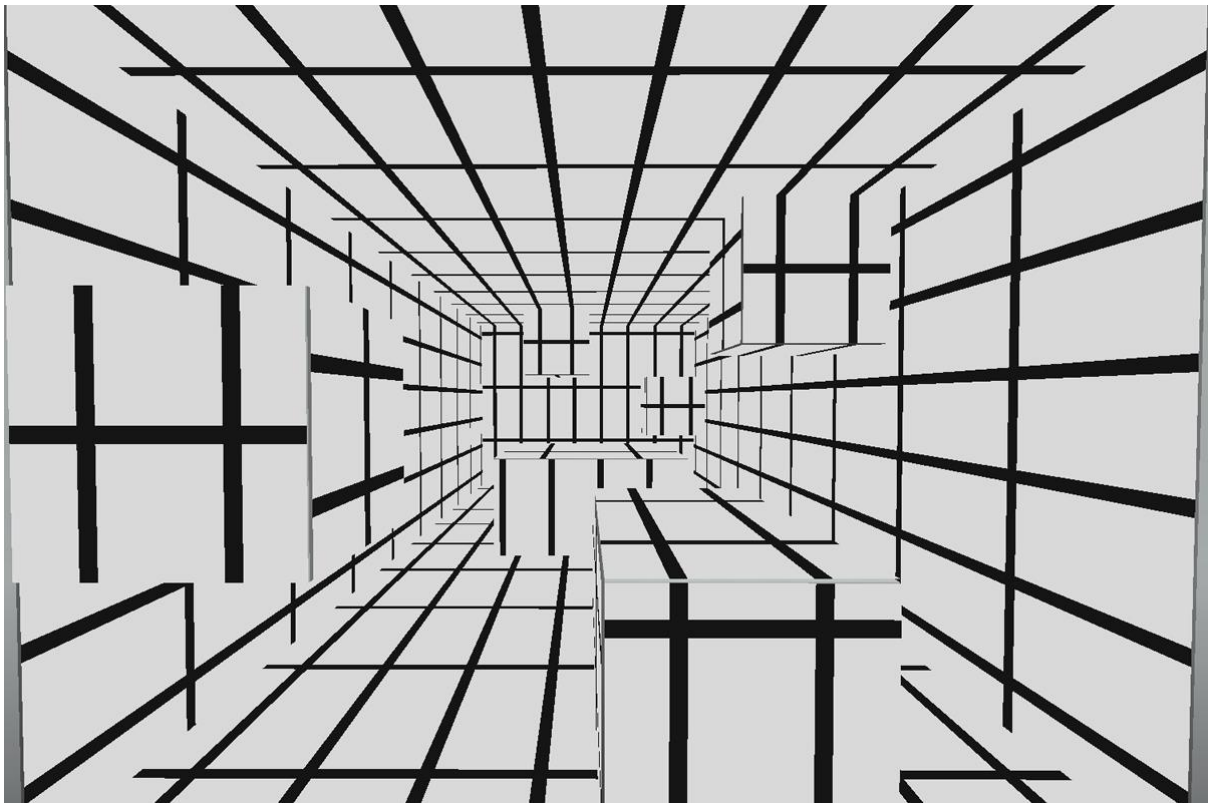


Figure 5

Our recreation of the same installation within Moloch's Gauntlet



Note. Original screenshot.

The central tension in Stocker's art is that it is rigorously geometric in its two-dimensional design while remaining oblivious in its application to three-dimensional space. Our goal was to use exactly this idea in *Minecraft* to reframe small areas of the world, creating spaces that would escape the game's standard aesthetic conventions and allow players to experience a different reality (such as Stocker's installation). Custom maps allow for blocks to appear other than they normally do in-game. As we had learned from watching the YouTube video, monochromatic all-white maps can create rooms devoid of spatial cues. We decided to go a step further, using colours and patterns on custom maps that allowed for not only mimicking Stocker's visual experiments, but for diving deeper into our own. Elaborating the escape room's visual identity was our way of escaping the confines of what *Minecraft* commonly lets the player see. To play with the way *Minecraft* looks is to reframe how it lets you think about its underlying construction. Our intervention undermines the game's imposed logic of blocks, grids and representation by creating spaces that reframe this otherwise inescapable symbology.

Using a web-based tool called MapartCraft (rebane2001), we converted images we designed into in-game maps. These maps are typically used by players to help orient themselves in their environment. This tool simulates in-game environments and renders them as maps, which we repurposed to function akin to wallpaper, allowing for reskinning entire surfaces

and rooms. [4] The maps we created referenced not only Stocker's work, but other op art work—including Bridget Riley's *Movement in Squares* (Riley, 1961)—as well as World War I dazzle camouflage, commercial carpeting, and television test patterns. Once the map files were inserted into the game, we started experimenting together to see if we could approximate the designs that initially inspired them, and perhaps more excitingly, to find unintended new uses and visual ideas for the components of those designs. This group experimentation, and the inevitability of misfires or failures that accompanied this experimental phase, was key to how we built the aesthetic components of the escape room and informed the rest of the project. It continues our practice of the allegorical build, in which failure is an opportunity[5] for critical thinking and exploration, both central to learning.

Figure 6

A comparison showing the difference between a typical Minecraft *map (left) and one of the maps we generated for the Esther Stocker room using MapartCraft (right)*

Note. Original screenshots.

In some cases, when fed a solid colour image, the tool created maps that stitched together various in-game blocks rather than generate a solid colour field (Figure 7). The patchwork

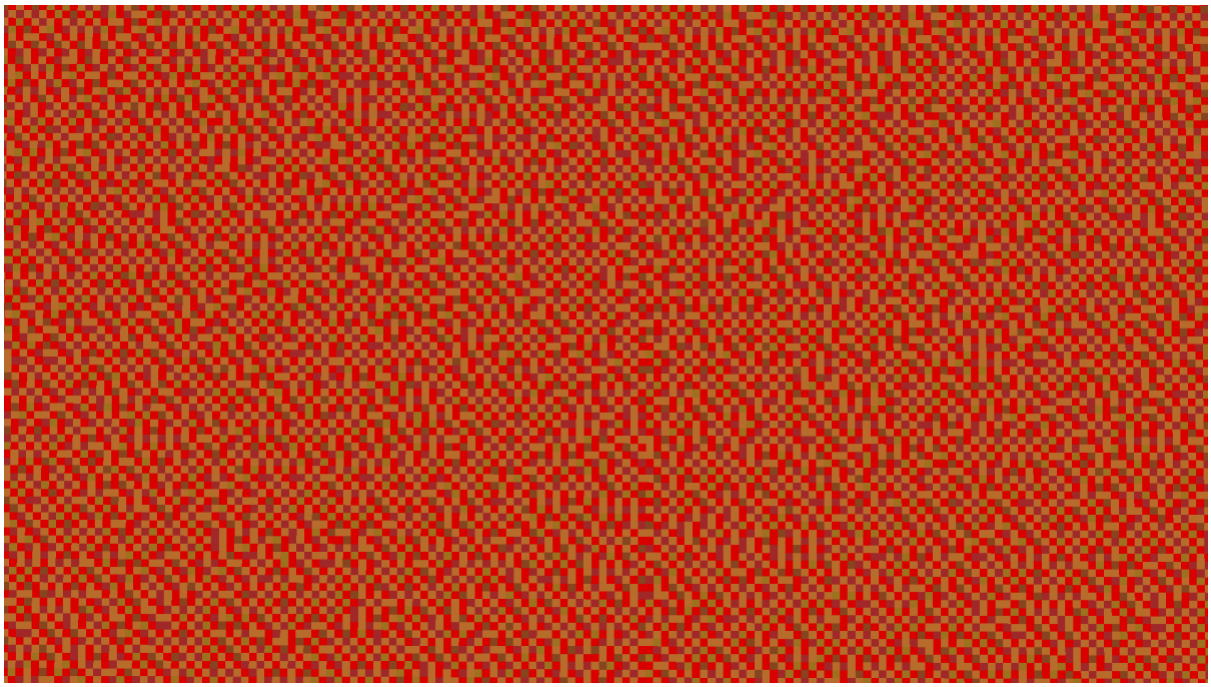
[4] The tool translates images into 128 x 128 pixel map files of imaginary terrain that never actually exists in game using analogous blocks that emulate the original colours, e.g., snow blocks for white areas, black wool blocks for black ones, grass or emerald blocks for blue elements. We eliminated the frayed map edge on the new maps (see Figure 6) by placing them into an item frame (see result in Figures 5, 9, 11 and 13).

[5] Structural failure opens the door to invention. The technical constraint of server lag caused by too many entities from the aforementioned map rooms caused some of our spaces to be unplayable. To mitigate the throttled framerate, we had to break the escape room into separate sections spaced hundreds of blocks away from one another. These are linked using command blocks, the tools closest to back-end development. This change was a blessing in disguise: It made our escape room modular—we could now change the order of events, or splice in entirely new spaces between. Not only was this beneficial to us, it also allows for easier edit points for those who want to build upon the escape room and reframe it for themselves.

effect of these maps had unintended effects. We found that when arranged on the inner walls of a tunnel two blocks high by one block wide, which is just large enough to accommodate the player's in-game avatar, this texture would swim around in a disorienting way as the player ran through. We decided to use these noisy solid colour patterns to create a space where all perspective is lost.

Figure 7

Close-up of the noisy colour field map art made up of red blocks



Note. Original screenshot.

We carved out a large room out of light-emitting glowing glass blocks and applied the noisy red maps. The backlighting which came through the maps from the blocks ensured that the light level would remain consistent throughout the space. By suspending a platform in the middle (also made of glowing glass and red maps), we created an entirely red room, with all spatial indicators collapsed in favour of pure colour. The noisy pattern looks approximately the same regardless of distance; while it felt more textured than a solid colour, it could achieve the same eradication of perspective as the pure white glowing void spaces in the YouTube video that inspired the map experimentation.

In effect, we had made a sensory deprivation chamber, or rather one where the only sense was an almost nauseating, complete red. Despite proving that an enclosed space without perspective was possible with our tools, this experiment was unusable, because all the light sources and map objects were too much of a burden on the server. The amount of maps necessary to create these fully disembedding spaces effectively slowed play down to a crawl, as the server, and player computers, tried to render the complex number of entities. The game is not built for this level of intervention, and runs best in its original, unmodded state, using the kitschy representational blocks it provides. Playing against its visual aesthetics and

material bias to call attention to the game's framing came at the cost of being able to play it at all.

However, this experiment was useful for several purposes: It first and foremost, taught us what outer limits our experiments could attain, playability notwithstanding. We also deduced that a smaller, more practical size for such lighting- and map-intensive spaces could maintain playability. This exploration resurfaced as a (map-free) replica of the "Red Room" from the Black Lodge in *Twin Peaks* (Figures 5 and 6). We also applied the backlit map lighting technique to the creation of a series of interstitial spaces which we partly painted with light, inspired by James Turrell's work (Figures 10-13).

Figure 8

The original Red Room from Twin Peaks*, 1990 (Fandom, 2022)*

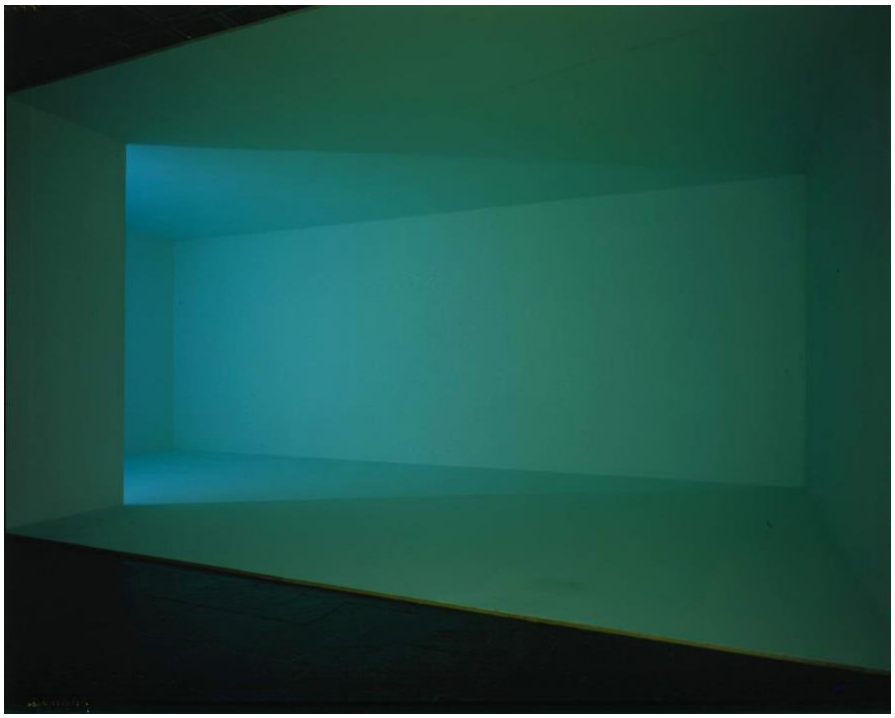
Figure 9

The Red Room replica within Moloch's Gauntlet

Note. Original screenshot.

Figure 10

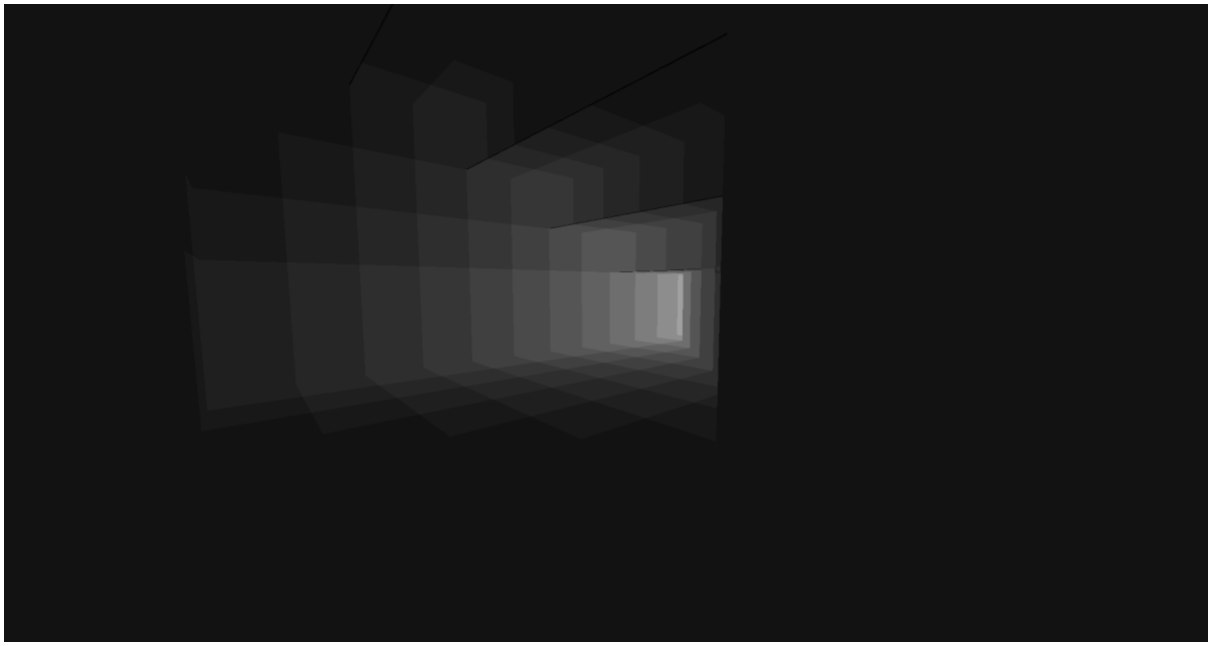
James Turrell, Wedgework 3*, 1974 (Turrell, n.d.)*



Vol 17(27): 1-34
http://loading.gamestudies.ca

Figure 11

Wedgework-*inspired room in Moloch's Gauntlet*



Note. Original screenshot.

Figure 12

James Turrell, Pneuma*, 2004 (Turrell, n.d.)*

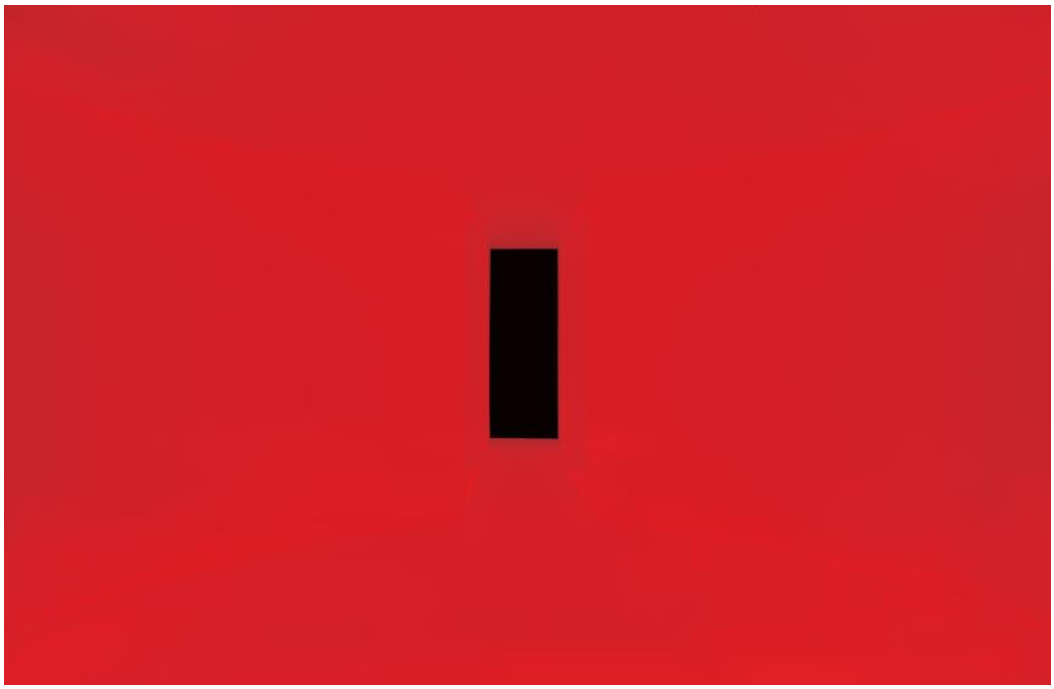
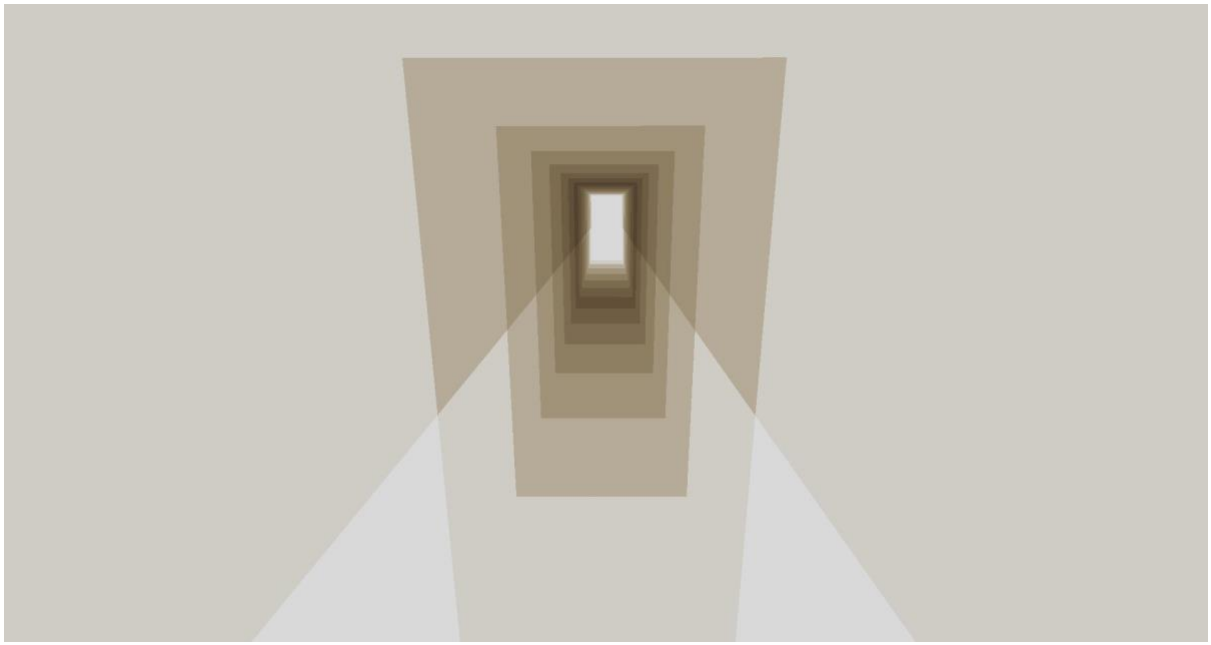


Figure 13

A hallway in Moloch's Gauntlet inspired by Turrell's Pneuma



Note. Original screenshot.

Failure, in this case, gave us a path forward. The failure and iteration process inherent to experimentation and central to the allegorical build could guide us through the rest of our challenges in building the escape room. This oscillation between failure and iteration in our aesthetic experimentation mirrors how critical thinking and allegorical interpretation functions "as a kind of scanning that, moving back and forth across the text, readjusts" in a way one can "characterize as dialectical" (Jameson, 1991, p. 168). Not only did our aesthetic experiments teach us how to build the rest of the escape room collaboratively, it also created the path forward that allowed our small research group to present reflections on our escape room in first, an artist talk (Author et al., 2022a), then a conference presentation (Author et al., 2022b), and third, this paper.

Playing with these textures and the thoughts and feelings they brought about in the player was central to elaborating the aesthetic experience we wanted for the participants. Standard *Minecraft* play is relatively agrarian and early modern. Our server's modpack[6] (TAG Minecraft Bloc, 2021), with its mechanical components and magical capabilities, works at unsettling this by introducing elements which students can use to reflect on the various concepts they learn through the class. These elements (like electrical generators, gears, conveyor belts, neon lighting and uranium ore) are resolutely cutesy, representational and kitsch as well. The mechanics of the escape room would need to use game elements, so there was no question that much of the project would be firmly rooted in *Minecraft*'s own aesthetic vernacular. Therefore, we needed to look for moments where we could reframe the

[6] A modpack is a collection of game modifications or "mods". These mods are mostly generated by the player community rather than professional game developers and are designed to extend upon the features and mechanics of the base or "vanilla" game.

experience to be discordant and visually unfamiliar in order to enhance the experience of disembeddedness in the escapees. This mirrors how modernity fragments experience, fracturing and restructuring relationships that obscure labour from objects and estrange people from each other.

Building styles in *Minecraft* are not fixed, but often mimic real world architectural movements or specific buildings, whether actually built or completely fictional. As a result, many uses of *Minecraft* in an educational context presuppose *Minecraft* to be a tool for the simulation or translation of physical objects. Conversely, we contend that communicating the shocking experience of modernity aesthetically—while simultaneously reframing our sense of what a video game in an undergraduate classroom is "for"—demands stepping outside of *Minecraft*'s established visual systems to create "a structure of feeling" (Williams, 1977, p. 133), which uses innovative techniques to produce new understandings that the game's intrinsically kitschy and calcified forms do not inherently afford.

Just as we found success iterating our initial set of maps, we were also iterating on a playful process of experimentation that had started earlier, with the sharing of—and even earlier with the production of—the video which introduced the map technique to us.[7] The breadth of what can be done in *Minecraft* is not tutorialized or documented within the game, but the tools suggest much more than can be executed by any given player. This leads many players to explore web resources in the form of wikis, forum posts, and videos on YouTube for examples of possible builds, or techniques for building within the game. The tool we used to create the maps also stands within this broad library of knowledge production around the game. In this way, the *Minecraft* metagame, that is, the production around the game by its fandom, functions as a form of scholarship, and "players studying game manuals, FAQs, and cheats are engaging in literacy practices, as are those players who write them" (Squire, 2005, p. 24).

Minecraft's body of research bridges aesthetic production and technical innovation and support, enabling deeper avenues of investigation than were possibly ever imagined for a game about building with blocks. "In the classroom, scaffolding is provided by the teacher. In a participatory culture, the entire community takes on some responsibility for helping newbies find their way" (Jenkins, 2006a, p. 178). By linking a classroom explicitly to an affinity space, students can take advantage of this second kind of scaffolding, directed less by the teacher and more by each other, and taking advantage of those knowledge producers in the wider affinity space who are themselves learning directly from each other.

In "Fans, Bloggers, and Gamers: Exploring Participatory Culture", Henry Jenkins (2006b) writes that "[f]ans are motivated by epistemaphilia—not simply a pleasure in knowing but a pleasure in exchanging knowledge" (p. 139). This pleasure in exchanging knowledge drives the metagame in gaming culture and the affinity space in learning. Jenkins (2006b) continues:

[7] For players, the search for knowledge grows from the experimentation and articulation of procedural elaboration, to the dissemination of the resultant knowledge. Both of these processes can be seen as part of a metagame, the way we are entertained by and play with games outside and around their intended mode of play (Boluk & LeMieux, 2017, p. 3).

> The fan community pools its knowledge because no single fan can know everything necessary to fully appreciate the series . . . [which] expands a community's productive capacity . . . and enables the group to act upon a broader range of expertise. (p. 139)

We see the wider *Minecraft* community function as an alternative academic space—an insight which in turn reframes our own idea of what a classroom is supposed to be. The mods are individual or group research projects translating real or fictional ideas into *Minecraft* vernacular. Modpacks, which assemble these mods into alternative experiences of the game, are analogous to journals or anthologies of collected critical works. *Minecraft* enthusiasts come together at conventions, in-game and in the real world, that often present highly technical or theoretical content akin to what might be presented at an academic conference. The game is a discipline, which can be harnessed for exploration into other disciplines. As the allegorical build implies, knowing about *Minecraft* can facilitate knowing about anything else. Critical thinking about *Minecraft*, in this affinity space, functions as its own body of knowledge, but it also operates as a way of engaging with other bodies of knowledge.

Concealing and revealing: contraptions beyond the code

Beyond the extensive well of research available around *Minecraft* lies the game's own materiality. The ability to deduce what the game can do by simply looking at in-game constructions and mechanisms creates the conditions for replicating them. The goal isn't simple mimesis but iterative exploration of in-game resources through procedural elaboration to build an experience unlike that which the game intentionally allows. This process echoes modern avant-garde artistic practice in which some works are "understood as an originally heterogeneous in spite of, or even despite, the projected presence of mimesis." (Benjamin, 1989/1991, p. 27) We harnessed the materiality of *Minecraft* to search for the "impossible possibility" of "a repetition within which what is repeated comes to be repeated for the first time" (Benjamin, 1989/1991, p. 26).

Our escape room, Moloch's Gauntlet, relies on seemingly elaborate mechanisms allowed by specific game "mods" or modded elements introduced to the base game to add additional items and functionality.[8] The first challenge we developed, which eventually became the second challenge in our escape room, is a logic puzzle we refer to as the "bomb puzzle". We divide the players up into separate rooms to perform a series of short brain teasers in which two players must interpret and communicate the information observable to them in their respective rooms in order for the third player to correctly interact with a mechanism in their own room (Figure 14). Despite this being a sequence of linked puzzles using the same spaces, we needed to reconfigure the rooms to either provide access to new information, or to new mechanisms, so that the information sets would only be provided when each new mechanism was revealed. The simplest way to do this would be to have blocks conjured and erased with command blocks—special blocks that can be placed in game and edited in order to execute simple lines of code. We use these blocks to teleport players and apply special effects to

[8] The ability for game modifications to "experiment with existing ideas and technologies in order to create something new," through communities of dedicated online fans who "provide an environment conducive to this form of experimentation" is discussed in Peter Christiansen's (2012) article "Between a Mod and a Hard Place".

them. However, we wanted the escape room itself to be more material and kinetic, like a living being—which is where mods came in.

Figure 14

Interior shot of the bomb puzzle

Note. Original screenshot.

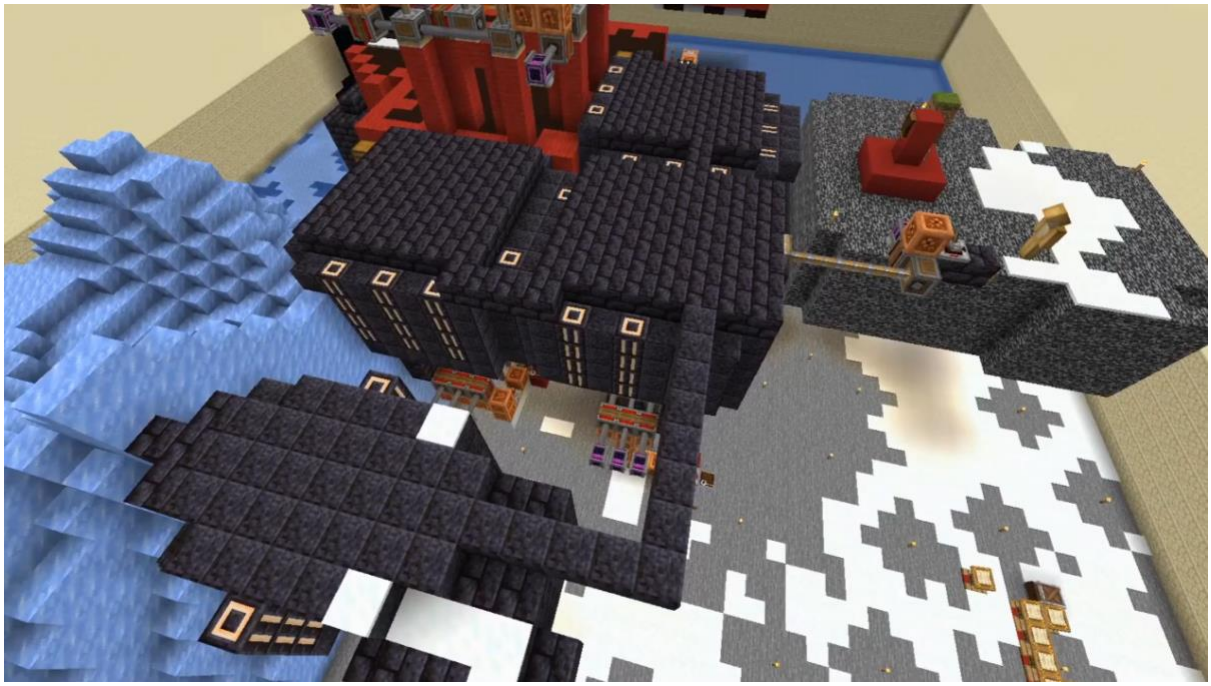
The Create mod by Simibubi (2019) adds to the tangibility of *Minecraft* construction by allowing blocks to be connected and moved together with new and complex mechanical systems. By providing motors, pistons, and driveshafts, blocks can be moved in ways unmodded *Minecraft* will not allow, without resorting to the invisible coding of command blocks. Using the argot of Create players, we call these connected block systems "contraptions".

The use of these contraptions began as an aesthetic choice. We wanted a wall in the escape room to fall and reveal the levers for the code puzzle. None of us had spent much time with the Create mod before working on this project, so developing with it became part of our own learning experience. We made a simple and bulky wall-moving contraption, which we found a way to slim down and make elegant using in-game "glue". This began a process of refinements with one team member working on the advancements of the others to create something more complex, and then another team member subsequently building upon that. This cycle (which performs the basic structure of collaborative creative thinking) helped us understand the capabilities of the Create mod together, a back-and-forth process (scanning, in Jameson's sense) that mimics the type of hands-on learning that the allegorical build method aims to achieve. Our contraptions became more and more elaborate and no longer only fulfilled an aesthetic purpose. As the project evolved, we needed it to be more automated, and we relied on additional contraptions to make this possible.

One of our most productive tools, in terms of time-saving, is the “unlidder”, a giant moving plane of blocks, similar to the moving walls we had already developed for use within the bomb puzzle (Figures 15 and 16). When activated via a lever, the unlidder slides the roof off the four rooms which made up the bomb puzzle. The unlidder is not a mechanism which directly interacts with players. It is a tool built directly from the same parts which make the puzzles work, but exclusively for our own use in developing and editing the bomb puzzle itself, with the simple task of allowing us to move in and out of the puzzle space with ease.

Figure 15

Exterior shot of the bomb puzzle, with the operating mechanisms visible, including the unlidder (the linked black stone surfaces located at the center of the image, which move to open and shut multiple rooms as a single unit when a switch is triggered). Here the unlidder is closed



Note. Original screenshot.

Figure 16

Here the unlidder is open

Note. Original screenshot.

The design of the bomb puzzle allows participants to eventually find a solution and unlock their exit, but the puzzle rooms also trapped us, the puzzle makers, making working on creating the puzzle time consuming and impractical. The unlidder is a mechanical solution to the puzzle-maker's need to escape the conditions of regular gameplay. While it is possible, as the puzzle designer, to move around the space by punching in a simple line of code as a teleportation command, this material, mechanical solution ends up being not only being the most effective long term, but also underscores the importance of *Minecraft*'s own affordances for allowing direct construction and manipulation in a reproducible and materially understandable way. The unlidder is ironically itself a form of puzzle solution, reframing and reflecting the question of who is solving the puzzle back from our imagined players onto ourselves.

Most of the mechanisms we use to facilitate puzzles hang unseen to the player outside of the rooms of the escape room, an exoskeleton of pistons and circuits that are transformed into an array of walls pulled out of the escape room's body. This mirrors the conventional education process: professors collect and develop their course materials, creating narratives and structures that are presented to students, while the pedagogical methodology, which created those course materials remains unseen and unquestioned outside of the classroom. As Charles Musser's work on the phantasmagoria outlines, this also reflects the progression of modernity itself. Revealing the mechanism of production has a history in modern technological performances, as in a 1803 performance of a phantasmagoria—a projection technology which allowed images to appear to float freely in the air—which promised that by revealing its methods, it would "expose the practices of artful imposters and exorcists, and to open the eyes of those who still foster an absurd belief in Ghosts or Disembodied Spirits" (Musser,

1990, p. 25). Once fascinated with gears and motors, we now hide so much of what moves our world behind blank, minimalist casings. The aesthetic experience of the escape room is carefully curated, and the only moving parts are what were permitted to exist as part of the player interaction. While the contraptions initially started out as our way to aesthetically enhance the experience, they quickly evolved into a key theme of the project and reflected our method of learning.

We were designing a playable learning experience, i.e. the escape room version of a curriculum on modernity, but in its construction we found we were creating a way for ourselves as student players to learn something beyond what the actual playable experience could offer. That process of construction revealed itself to be a pedagogical tool. This inspired our choice to reveal the inner workings of the build to the student players of our escape room as well. The potential of what a player can learn, we determined, rests not simply in playing the escape room, but in examining how it was constructed. Bruno Latour (2005) writes that "to say something is constructed means that it's not a mystery that has popped out of nowhere, or that it has a more humble but also more visible and more interesting origin. . . . The same is true of artistic practice." (pp. 68-69). Dispelling the mystery and revealing what is possible echoes our progression as we progressed from students to student researchers, now working alongside our professors to help present the class and guide the new students through it.

The materiality of *Minecraft* means that making these elements visible also makes them highly parsable by the players, in the same way that looking at a basic motor reveals how it operates. This is in contrast to a software's code, for example, which is not visible to the user's eye. Encouraging the players to see what makes the escape room work is a way of unblocking their "student voice" by facilitating their own exploration of the game's potential. Described by John Jagersma (2010) in "Empowering Students as Active Participants in Curriculum Design and Implementation", student voice is "the systematic inclusion and empowerment of students in the decision making processes of schools" (p. 3). Participatory design projects give students increased responsibility and agency, which leads to higher engagement and better school performance (Jagersma, 2010, pp. 6-7). Passing this opportunity on to other students, by showing them the design process and encouraging them to build and share further, became part of the escape room experience. As undergraduate students working as student researchers, interacting in this manner with our peers gives value and aspirational potential to our student voices. We hoped to inspire the next cohort to involve themselves in further research as well.

The explicit nature of *Minecraft* as a creation tool is a throughline of this project. Normally, when doing level design and game making more broadly, the craftsperson loads up an external piece of software that allows them a godlike ability to interact with the world. This software's interaction with the final game becomes invisible, sublimated into the code. We built everything directly, explicitly, within the game's world. Tools like the unlidder offer us more insight into how the game operates, but our perspective is never godlike, but rather allegorical at best, an approximation of how we think the game works. In changing game modes, we simply pull out a different set of tools, which let us fly around the space, or place blocks in the normal fashion, but freed of the normal material/economic restrictions of *Minecraft*—which have been replaced as constraints by the need to design something which can function within the computing power of our rented server. Our economic restrictions

move from in-game (how fast the game systems allow you to mine) to external (how fast a server can we afford, and how much of the class server's overhead do we want to take up).

While we conceal our mechanisms from the players over the course of their experience, the experience of being shown one of our contraptions is a part of their final reward. Once players have successfully passed through the puzzles, they break through the screen of the Esther Stocker-inspired room and enter a vibrantly colourful room reminiscent of a television test pattern which showers them with rewards (Figure 17). This randomized "loot shower" sits atop this room and consists of a series of dispensers with buttons on them which are pressed in sequence by a pair of cartoonish hands with pointed index fingers roving back and forth across a track. The sound of the buttons rapidly clicking is the key to players that there is something mechanical at work dispensing their rewards.

Figure 17

The loot shower mechanism

Note. Original screenshot.

The apparatus is simultaneously complex on first sight, while the hands pressing the buttons are immediately readable; this combining of technology and humour evokes Rube Goldberg's cartoons of elaborate, impractical inventions. Goldberg invited readers to think about their creation as a communicative process; they are "the whimsical solutions of an independent tinkerer bent on asserting his right to dream" (Marzio, 1972, p. 21). Awed as we were by this whimsical and odd device, and the literality of the fingers pushing buttons to dispense rewards, we decided to show it off to players: after they leave the reward room, they ascend a set of stairs where they are presented with a view of the clickity prize machine behind glass. This is the same room which contains the credits for the escape room project, where we

acknowledge ourselves to the player (as well as our research affiliations and funding sources).

In revealing the mechanism of Moloch's Gauntlet, we reveal ourselves, inviting the student player to reframe themselves as the potential engineers of future mechanisms, and the potential designers of future escape rooms; the wall comes down, and we offer them their place in our place. This visibility of the machine invites, both explicitly and implicitly, learning through visual replication, and subsequently peer-focused collaboration. It is not only *Minecraft*'s metagame that allows students to deepen their pedagogical engagement, but its materiality and accompanying ability to see the acquired techniques of their peers and replicate them to their own ends.

Death isn't failure: Learning through iterative techniques

In "Seeing Our Way Into Learning", Shelley Brice Heath (2010) writes:

> The visual arts with accompanying focus of attention on details of features, such as colour, form and line, ensure attention to perception and engagement of the 'visual brain', which, in turn, resonates with remembered experience and linguistic representation. Manipulation of these features of the visual arts, from drawing or fingerpainting in early childhood to the complexities of creating sequences on video, provides essential opportunity for focusing joint attention, taking on numerous roles, bringing memory to external form and developing language. All of these skills are critical for academic achievement and all underlie literacy and numeracy as traditionally conceived. (p. 123)

Minecraft allows for the same reinforcement of learning through visual exploration that we associate with the benefits of visual arts. The allegorical build allows students to use blocks to create projects that connect them to the course subject in a playful, material way. *Minecraft*'s literality further allows students to see their peer's choices and learning process rendered explicitly in-game. This is an artistic process that reinforces pedagogical goals.

This experience of *Minecraft*'s materiality subsequently informed our puzzle design. Being able to literally and materially conceive of *Minecraft*'s possibilities through direct visual replication, we decided to do all of our prototypes in *Minecraft* first rather than trying to prototype anything in another digital medium. This mode of in-game prototyping by experimenting with the mechanics on a fundamental level is common to *Minecraft* play, and is invited by the game's limited tutorial. Our use of modded *Minecraft* introduced us to new mechanics and modes of play, ostensibly forcing us to renegotiate the game as though we were encountering it for the first time through the exploration that procedural elaboration demands (Watson, 2017, p. 83). This is in contrast to traditional game development, in which the game's mechanisms are plotted outside of the game itself as a way of saving time and money. *Minecraft* affords direct experimentation, so we did not have much to lose by going straight to building in *Minecraft* on the server.

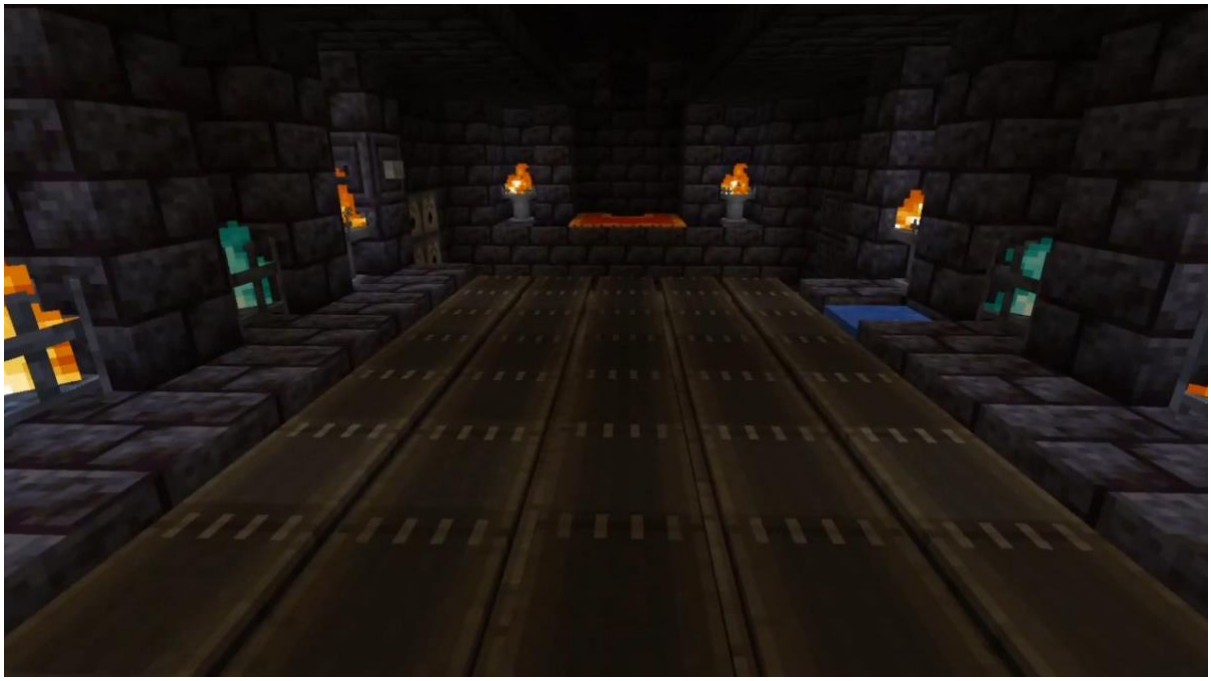
This ability to directly experiment within the final medium emerged most clearly in the literally named Death Bridge puzzle. The final trial of the escape room, the Death Bridge feels different from the previous two puzzles that form Moloch's Gauntlet because its inception came from a predominant desire to create a puzzle that fit thematically with the figure of Moloch rather than to encourage active collaborative interplay. Like all of the other puzzles, teamwork and team bonding remains a focus, and the puzzle still functions as a group activity since it's easier to complete with multiple people. However, this is a far more chaotic group activity than the previous two because it allows more freedom in exactly how players choose to solve it. In other words, it is more actively playful and emergent than the other two. This is the escape room puzzle with the simplest solution, whose theming directly hints at its solution. Unlike the others, it is less about the collaborative process, than it is about prompting the players' answer to a simple question: how do we get to the other side?

Ultimately, it is this prioritisation of thematics over game dynamics that made it a unique challenge in comparison to the other two. The concept of this puzzle came from our previous experience within the class structure. During the final weeks of the first class semester, its staff, under the guise of Moloch, tasked us with collecting heads from various creatures from the game as an offering, including our own. To achieve this, some players repeatedly threw themselves off of cliffs and tall structures in order to die and collect the contents of their graves, which included the heads. This experience stuck with us, and was part of the inspiration for the Death Bridge. Watching graves stack as players enthusiastically died led us to consider using death as a building mechanism.

In essence, the group of three find themselves in a room with a large pit in the centre. The only way to reach the other side is for the players to throw themselves into the pit, sacrificing themselves to Moloch (Figures 18 and 19). In most games, character death is the ultimate failure condition. In our modded version of the game, every time a player character dies, a gravestone object is created at that precise location (henkelmax and pinguin1678, 2015). When enough gravestones stack on top of each other, the group can use the stack as a platform to walk to the other side. However, as the gravestones stack, it becomes increasingly difficult to die from fall damage. Elements were added to the room design to allow players to damage their health to the point where even a short fall would kill them, such as braziers, and a button that triggers a volley of arrows was included to allow players to kill their teammates as the gravestone bridge nears its completion.

Figure 18

The death bridge puzzle viewed from the entrance, with the exit by the rug on the far wall



Note. Original screenshot.

Figure 19

The death bridge puzzle pit, with the 3 x 3 arrow dispensing mechanism

Note. Original screenshot.

The braziers had more of a role originally because there was no arrow button. In the initial build, we determined how deep the pit would have to be by trial and error; we threw ourselves from taller and taller heights until we determined what we initially thought was the right depth for the pit. In this initial assessment, the braziers were essential to dying when the stack became tall and when it became more difficult to succumb to fall damage. The addition of the arrow button and the ability to deliberately kill teammates added another collaborative element to the mix, underlining the idea of unstructured teamwork.

This experience of mass death is an idea we expanded upon past the first iteration of the class: the idea of using a puzzle in a video game as a way of thinking about physical trauma as a bodiless and/or half-bodied entity. Addressing complex ideas of embodiment in video games is possible; digital games can lend themselves well to these kinds of themes because of the ways in which they incorporate interaction, and the absence of any real death or gore offers the possibility of reflecting on these themes from a safe position.[9] This in part is why the Death Bridge requires out-of-the-box thinking. Usually you need to avoid death in a video game, but given the way Moloch works, you do not have a choice not to die; it is the only way to get anywhere with him, and an embodiment of humanity's repeated sacrifices on the altar of modern progress.

The unequivocal element of sacrifice connects the course material to the inverted class structure. A successful class taught in this structure encourages students to reframe their personal success in service of the success of class as a whole. Students work on their own and then share that knowledge among themselves. There is sacrifice inherent to that structure, as students give of themselves in order to help their classmates interact with the course material. In doing so, their sacrifice of time and energy helps cement their own understanding. This puzzle explicitly connects the idea of personal sacrifice to group success. Working as a team is a difficult balancing act, as we discovered, because you usually need to give up the version of the project that is ideal for you in favour of something that works for everyone; there is always the need for compromise.

In video games, death typically implies failure. However, failure is also central to puzzle and game development more generally. This puzzle needed constant revisions, and the depth of the game development challenge was a learning experience in solving design problems and resolving failure as a collaborative exercise. During the building phase, we all went off to do prototypes on our own, regularly discussing what we had made later as a group, leading to a mix of approaches, each one informed by our own art backgrounds. The playtesting phase was a bit different, as we all discussed and planned our approach as a group before going ahead with the play sessions and were present for all of them.

During playtesting, the rooms leading up to the Death Bridge puzzle caused a lot of confusion for some of the participants and we needed to make many adjustments. These rooms, nicknamed "the meat rooms", gave many explicit clues as to the puzzle's solution. The initial group of playtesters rushed through them instead of taking the time to observe and contemplate them like we thought they would do. This may have made the Death Bridge

[9] Inviting meaningful reflection through incorporating themes of death into game narrative is discussed by Diana and Vlad Melnic (2017). The ways in which death is incorporated into different games, and the history of the "lives" system is outlined by Jason Tocci (2008).

puzzle more difficult and less intuitive for them. Subsequently, we placed a few roadblocks throughout the section that forced the group to linger in certain areas. In subsequent tests, this prevented team members from rushing through the section alone and thus from separating from the rest of the group as in the initial test.

The playtesting phase was interesting, because the reception to the puzzle was quite dramatic at times. Compared to the previous two puzzles, playtesters had strong opinions ranging from light amusement to abject disgust. Despite the mixed feedback, it became clear that we needed to expedite the dying process, because building the stack was taking so long that most of the playtesters lost interest before the end. Essentially, the final stages of the puzzle became a slog and consequently, boring! Human sacrifice should never become boring or it defeats the whole purpose. We knew we needed to make some significant changes in order to make it work and began introducing elements, like the arrow button, to make things more interactive and expedient.

In addition to the design issues, we experienced some technical issues. As more and more things went wrong, it eventually became apparent that this was an incredibly difficult puzzle to get right, which felt strange, because the idea seemed very simplistic and an obvious fit for the themes of this class. As a team, we had to learn how to approach a lot of new problems—not individually but together—and after some more reflection, something else clicked: something about the whole process that we had not anticipated.

Designing a puzzle based on the idea of sacrifice and not gameplay dynamics first required more creativity and made it more difficult to use established, tried-and-true approaches. In the process, we noticed a dynamic emerge between us that we had not achieved prior. As we scrambled to solve the problems and threw all of our heads together to do it, our collaboration evolved into a learning experience and a way of understanding each other better at the same time. Therein lies the escape room's biggest achievement in fostering collaboration—it made us all more aware of how we each worked, and of how to solve complex design problems in the context of a team unit.

Given how involved game development is, we realized that had we done something different; these team dynamics would probably not have emerged in another context than the classroom. This collaborative, failure-centred aspect of the game design and development process points to potential avenues for pedagogical exploration. Education often focuses on success but the iterative failure of the game development process promotes a collaborative approach and creative problem-solving that can deepen student relationships and strengthen peer-focused learning.

While educational practice restricts game development's value as a teaching tool to software engineering or computer science courses, the relative accessibility of modded *Minecraft* allows for a game development framework to be applied to other educational spheres. The allegorical build can encompass the ability for students with limited technical knowledge to use the documented benefits of game development and design thinking techniques for group and individual learning. Traditionally associated with acquiring skills in "software requirements, software design, software architecture, programming, 2D and 3D graphic representation, graphic programming, artificial intelligence, physics, animation, user interfaces, and many other areas within computer science and software engineering" (Wang

& Wu, 2009, p. 2), our game development experience instead deepened our understanding of the course material in an ongoing way, and allowed us to interrogate and reframe our role as students, and our attitudes as potential educators.

Minecraft can function as an "open platform" (Wang & Wu, 2009, p. 2) that allows students to use game development techniques to further pedagogical goals outside of the traditional computer science domain. *Minecraft*'s representational logic invites experimentation and iteration without coding expertise. Just as our puzzle is about learning to die and therefore fail, in order to ultimately succeed, learning how to make games is in one way learning how to learn from failure, of treating each negative setback as a lesson that is in fact another positive step towards success.

Conclusions

Designing puzzles and games within *Minecraft* is an extension of playing *Minecraft*, without requiring specific investigation into game theory or design. Creating a world of blocks which resemble objects from our real world has the effect of initially concealing the code from the player. However, that code comes to the forefront when there is a mismatch between real world logic and *Minecraft* logic.

Minecraft relies on its players being able to read its objects as real-world objects. A player recognizes that a block textured to look like a wooden log will be used for purposes analogous to the ways a wooden log is used in real life; however, the *Minecraft* log *isn't* a real-world log, and its physical properties and uses do not exactly mirror real world uses of logs. This usability gap between signifier and signified, game object and real-world object, confronts the player with an unfamiliarity that inspires curiosity and exploration, leading to procedural elaboration, wherein the player "explicitly investigates, documents, and renders visible the (sometimes unexpected) results of procedure that are only implied as potentials in the game code itself" (Watson, 2017, p. 76).

If *Minecraft* logic mirrored real world logic exactly, procedural elaboration would not offer the learning opportunities it does. Beyond the coding platforms usually associated with teaching game design, modded *Minecraft* provides a unique opportunity to think critically around the platform's intrinsic failures and provide the opportunity for students to signal their commitment to meaning that steps past the symbolic content of the game into the classroom and beyond. What began as experimentation within a game became an entirely new way of understanding what learning could look like at the undergraduate level; our initial engagement as students deepened into meaningful exploration and expression of this experimentation's potential as researchers. Playing with the structure of the game to reframe its potential as a teaching tool through visual and procedural defamiliarization allows for critical exploration of the educational format in which it is deployed. As a global pandemic forced questions about the structure of a university education, reframing the game for learning also reframes the learning itself at a moment where the uncertainties of the university system became most visible. As with all infrastructure, its "normally invisible quality … becomes visible when it breaks: the server is down, the bridge washes out, there is a power blackout", (Star, 1999, p. 382) or when university buildings are closed and the classroom suddenly moves online.

Building Moloch's Gauntlet was an attempt to create a playable experience for the class that followed ours that would deepen their engagement with the course material, but ultimately, it became a lived experiment in modded *Minecraft* as a pedagogical tool. Our experiments in disrupting the game's aesthetics, building contraptions, and designing puzzles became a reflection on how *Minecraft* provides an extended body of knowledge, materially parsable tools, and an accessible game design and testing environment. The construction of this project continued the kind of allegorical thinking that we had been doing in the original class; our initial participation in the inverted class structure brought us to the point where we flipped the classroom again as we took on the role of researchers and then cast ourselves as educators. Our role flipped a third time, as we looked at ourselves and our experiences building the escape room as an object of research. How does reframing a teaching tool as a thinking tool broaden the allegorical build? Our experience shows that educators can build curricula that task their students with constructing teaching tools, not only to be used to actually teach other students, but as objects of reflection for their student researchers/creators, allowing an escape from the confines of the traditional classroom itself.

Writing this paper became an escape room as well. The process of building Moloch's Gauntlet enclosed us in references and reflections on the past and potential of modernism and university education; this paper is our academic unlidder, our way of revealing the thought process that brought us here.

This project was made possible thanks to the generous support of the Concordia Lab for Innovation in Teaching and Learning (LITL).

References

Benjamin, A. (1991). Interpreting Reflections: Painting Mirrors. In A. Benjamin (Ed.), *Art, Mimesis and the Avant-Garde: Aspects of a Philosophy of Difference* (pp. 6–41). Taylor & Francis e-Library. (Reprinted from *Oxford Literary Review, 11(1/2), Philosophical Encounters*, pp. 37–71, 1989, Edinburgh University Press)

Binkley, S. (2000). Kitsch as a Repetitive System: A Problem for the Theory of Taste Hierarchy. *Journal of Material Culture, 5*(2), 131–152. https://doi.org/10.1177/135918350000500201

Boluk, S., & LeMieux, P. (2017). *Metagaming: Playing, competing, spectating, cheating, trading, making, and breaking videogames*. University of Minnesota Press.

Callaghan, M. L. (2016, June 2). *Minecraft Is Now The Second Most Popular Game Ever*. Popular Science. https://www.popsci.com/minecraft-sells-over-100-million-copies/

Christiansen, P. (2012). Between a mod and a hard place. In Erik Champion (Ed.), *Game Mods: design, theory and criticism* (pp. 27-50). ETC Press. https://dl.acm.org/doi/10.5555/2554084.2554086

Fandom. (2022, September 4). *Grass Block*. https://minecraft.fandom.com/wiki/Grass_Block

Fandom. (2022, June 30). *Red room.* https://twinpeaks.fandom.com/wiki/Red_room

Fisher, M. (2014). *Ghosts of My Life: Writings on Depression, Hauntology and Lost Futures*. John Hunt Publishing Limited.

Ginsberg, A. & Williams W. C. (1959). *Howl and Other Poems* (2nd ed.). City Lights Books.

Heath, S. B. (2010). Seeing our Way into Learning. *Cambridge Journal of Education*, *30*(1), 121–132. https://doi.org/10.1080/03057640050005816

henkelmax, & pinguin1678. (2015, December 5). *GraveStone Mod*. Curseforge. https://www.curseforge.com/minecraft/mc-mods/gravestone-mod

Jagersma, J. (2010). *Empowering Students as Active Participants in Curriculum Design and Implementation* (ED514196). ERIC. https://eric.ed.gov/?id=ED514196

Jameson, F. (1991). *Postmodernism, or, The Cultural Logic of Late Capitalism*. Duke University Press.

Jenkins, H. (2006a). *Convergence Culture: Where Old and New Media Collide*. New York University Press.

Jenkins, H. (2006b). *Fans, Bloggers, and Gamers: Exploring Participatory Culture*. New York University Press.

Jeracraft. (2020, May 3). *Most INSANE Minecraft MAP ART Tips, Tricks & Pranks!* [Video]. YouTube. https://www.youtube.com/watch?v=DiJeX_Mnf4w

Lang, F. (Director). (1927). *Metropolis* [Film]. UFA GmbH; Parufamet.

Latour, B. (2005). *Reassembling the social: An Introduction to Actor-Network-Theory.* Oxford University Press.

Lynch, D., & Frost, M. (Executive Producers). (1990–1991). *Twin Peaks* [TV series]. Lynch/Frost Productions; Propaganda Films; Spelling Television.

Marx, K. (1887). *Capital: A Critique of Political Economy, Volume I* (M.Samuel & E. Aveling, Trans.) (F. Engels, Ed.). Progress Publishers. (Original work published 1867)

Marzio, P. C. (1972). Art, Technology and Satire: The Legacy of Rube Goldberg. *Leonardo*, *5*(4), 315–324. https://doi.org/10.2307/1572586

Melnic, D., & Melnic, V. (2017). Saved Games and Respawn Timers: The Dilemma of Representing Death in Video Games. *University of Bucharest Review, 7*(2).

Musser, C. (1990). *The Emergence of Cinema: The American Screen to 1907*. University of California Press.

Orchard, K. (2007). *Kurt Schwitters: Reconstructions of the Merzbau*. Tate. https://www.tate.org.uk/research/tate-papers/08/kurt-schwitters-reconstructions-of-the-merzbau

Pearcy, M., Guise, E., & Heller, D. (2019). "Escape the Room" – a strategy for problem-based learning and student inquiry. *Social Studies Research and Practice*, *14*(3) 306–320. https://doi.org/10.1108/SSRP-09-2018-0036

rebane2001. (n.d.). *MapartCraft*. MapartCraft. Retrieved September 17, 2022, from https://rebane2001.com/mapartcraft/

Riley, B. (1961). *Movement in Squares* [Painting]. The Arts Council Collection, Southbank Centre, London, United Kingdom. https://artscouncilcollection.org.uk/artwork/movement-squares

Authors (2022a, May 13). [Artist talk].

Authors. (2022b, June 2). [Conference presentation].

Shklovsky, V. (2004). Art as Technique. In Rivkin, J., & Ryan, M. (Eds.), *Literary Theory: An Anthology* (2nd ed., pp. 15–21). Blackwell Publishing Ltd.

simibubi. (2019, July 18). *Create*. Curseforge. https://www.curseforge.com/minecraft/mc-mods/create

Simon, B., & Wershler, D. (2018). Childhood's End (or, We Have Never Been Modern, Except in Minecraft). *Cultural Politics*, *14*(3), 289–303. https://doi.org/10.1215/17432197-7093310

Squire, K. (2005). Educating the fighter: buttonmashing, seeing, being. *On the Horizon*, *13*(2), 75–88. https://doi.org/10.1108/10748120510608106

Star, S. L. (1999). The Ethnography of Infrastructure. *American Behavioral Scientist, 43*(3), 377–391. https://doi.org/10.1177/00027649921955326

Stocker, E. (2004). [Physical Installation featuring Black and White Lines in a Grid-Like Pattern]. AR/GE Kunst Galerie Museum, Borzen. https://www.estherstocker.net/?page_id=8

TAG Minecraft Bloc. (2021, July 13). *The Allegorical Build*. Curseforge. https://www.curseforge.com/minecraft/modpacks/allegoricalbuild

Tanenbaum, K., & Tanenbaum, T. J. (2009). Commitment to Meaning: A Reframing of Agency in Games. *Proceedings of the Digital Arts and Culture Conference, UC Irvine*. https://escholarship.org/uc/item/6f49r74n

Tocci, J. (2008). "'You Are Dead. Continue?': Conflicts and Complements in Game Rules and Fiction." *Eludamos: Journal for Computer Game Culture, 2*(2), 187–201. https://doi.org/10.7557/23.5981

Turrell, J. (n.d.). *Pneuma (2004)*. James Turrell. Retrieved December 19, 2022, from https://jamesturrell.com/work/pneuma/

Wang, A., & Wu, B. (2009). An Application of a Game Development Framework in Higher Education. *International Journal of Computer Games Technology, 2009*, Article 693267. https://doi.org/10.1155/2009/693267

Watson, N. (2017). Procedural Elaboration: How Players Decode Minecraft. *Loading… The Journal of the Canadian Game Studies Association*, *10*(16), 75–86. https://journals.sfu.ca/loading/index.php/loading/article/view/181

Turrell, J. (n.d.). *Wedgework 3 (1974)*. James Turrell. Retrieved December 19, 2022, from https://jamesturrell.com/work/wedgework3/

Wershler, D., & Simon, B. (2021). The Allegorical Build. Minecraft and Allegorical Play in Undergraduate Teaching. *Gamevironments*, (15) 197–236. https://doi.org/10.48783/gameviron.v15i15.148

Williams, R. (1977). *Marxism and Literature*. Oxford University Press.

Wills, G. (2012, December 15). Our Moloch. *The New York Review of Books*. https://www.nybooks.com/online/2012/12/15/our-moloch/