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Minecraft as a Multi-Faceted Learning Tool

On the surface, Minecraft, a mix of different actions centered around mining and crafting, seems simple. Its graphics are clunky and the concept is simple, but this lets players of any age easily jump in and start exploring, crafting, battling, and creating. Minecraft has captivated millions of players worldwide, selling over 21 million copies on the PC alone and over 71 million paid downloads on every platform combined, making it the third-best selling game in the history of gaming, second only behind Wii Sports and Tetris (Wikipedia 2015). Furthermore, the majority of Minecraft players are under the age of 21, accounting for ~66% of all players, according to an ongoing poll done by the site Minecraft Forum. These statistics have captured the attention of educators at all levels, all with the hopes of capturing the attention of kids and teens in the classroom at a time when well-designed, engaging curriculum is increasingly necessary to keep interest in the classroom.

Minecraft has often been labeled as a sandbox game, mainly due to its relatively open-ended gameplay. Being a sandbox game has its advantages; It can be built and extended into something that best suits the player's style and the experience can be tailored into the perfect learning environment for the topic at hand. The magic of Minecraft comes in its ability as a strong platform for learning. This quality has been embraced by the community since 2011, when some of the first educational curriculum created in Minecraft was released. Stepping forward to today, hundreds of lesson plans and their corresponding worlds can be downloaded and used in the classroom. Players aren't just learning in the classroom with worlds designed specifically for an educational environment, though. The very nature of Minecraft's design gives the player just enough guidance to understand the mechanics of the game, then immediately gets out of the way so that players can follow their own path and be in charge of their learning experience. The majority of the game's design is passive and experiential, and gives players room to not only

create their own experience out of the game, but to join others who are looking for similar experiences out of the game. Players often congregate on places such as Minecraft Forum, which is home to over 7 million posts about Minecraft servers and mods (or modifications) to the game. Mojang, the creators of Minecraft, have taken a simple concept and turned it into an expansive system of creation and community.

Minecraft as a Game

Although Minecraft is commonly heralded as a simple sandbox game, there are a lot of elements in the game that align with Jim Gee's 13 learning principles. Going even further, Minecraft can be modded to create a multitude of different gameplay styles that fit any player's own preference. This is an important distinction to make; Minecraft can be better analyzed if it is looked at as a platform for multiple different play styles. We can analyze the base game, but in essence, the game can be expanded and changed into something completely different. Looking at the basic vanilla version of Minecraft and comparing it to Gee's 13 learning principles, we see that Minecraft really stands out compared to traditional play styles, and when we take into account popular modifications to the game, we find even more principles to be present.

Minecraft largely employs Gee's concept of *Co-design*, insisting that players have an active role in creating their own adventure in the game, similar to how a good learning environment makes students believe that they are active agents in their learning experience. If players do not take time to explore the world within Minecraft, the game will not give out much in return. The game does not explicitly push the player to complete certain actions. Instead, there is an achievement system that rewards the player when they complete certain actions, such as punching down a tree or flying a pig off of a cliff. Achievements, though, are not typically a cornerstone of gameplay for most Minecraft players.

Another element to appear in Minecraft is the concept of *Cycles of Expertise*. Because players aren't given express guidance as to what to do or accomplish in the game, players spend a lot of time being adventurous and trying things, which inevitably leads to failure. According to Bereiter and Scardamalia, "expertise is formed in any area by repeated cycles of learners practicing skills until they are nearly automatic, then having those skills fail in ways that cause

the learners to have to think again and learn anew.” These events happen from the moment that the player starts a new world in the game. Every action, guided or unguided, contributes to player’s expertise, and they are constantly improving their expertise and minimizing mistakes in future play. One such example in-game is when a player navigates to a cave, a popular destination in the game for mining and adventure. If a player enters a cave without many resources, they run the risk of dying from one of the mobs in the cave and losing everything in their inventory. One of the first conundrums that the player is faced with is to make torches, the source of light in-game. First though, they need to mine coal, which is generally found in caves. The caves, which are entered from holes in the ground or through the side of a mountain, are unlit, thus requiring torches to safely enter. If the player is wise, they will search for coal in a place that’s more well lit, such as a rocky area of a mountain area or an opening of a cave that is lit by sunlight. If a player is new to the game, they may try to gather the resources as they see them, scrambling to find some source of light before the sun sets on the first day cycle. Once a player has enough coal to craft some torches, they must develop an expertise for exploring the cave. Because the caves, like everything else in Minecraft, are procedurally generated, the player cannot expect exactly what they will encounter in the cave, but instead should employ a set of skills that only come with experience. They must know strategies, not a list of actions to be done in a linear fashion, to properly navigate the caves. Moving to a much broader perspective, players will start to maximize efficiencies and start to create solutions that won’t even require input from the player. Their expertise gives them the opportunity spend time on other, perhaps more creative, endeavors in-game.

Another huge principle that Minecraft employs is *Customization*. According to Gee, “different styles of learning work better for different people.” He also contests that “people cannot be agents of their own learning if they cannot make decisions about how their learning will work.” Minecraft can be seen as a platform that can be customized into any number of different play styles. Within the vanilla game, players not only have the choices to make the game their own, but are almost required to in order to survive. The game doesn’t care how you do it; there are no points for building a mansion compared to a shack made out of dirt. The game allows the player to be as creative as they’d like and lets them build their skills at their own pace.

Because of this, players have created some amazing inventions and built some amazing structures in the game. The game isn't trying to push the player through a storyline; the player is free to employ the tools of the game into something that best suits their learning and play styles.

Another principle largely prevalent in Minecraft is Gee's principle of *Systems Thinking*. Gee says that "people learn skills, strategies, and ideas best when they see how they fit into an overall larger system to which they give meaning." Because Minecraft operates on a system of resources, players must understand things such as where and how to obtain a certain resource. The game, again, never explicitly tells the player these details. The player must travel around and find the resources themselves. Actions such as punching trees gives the player wood, killing sheep gives the player food, and mining iron ore gives players the opportunity to melt the ore down to turn it into raw iron for other tools. The player must learn, for example, that a wooden pickaxe requires wood planks, wooden sticks, and a crafting table to combine all of the elements together. Most users will look to online resources to find the different recipes for the tools, furniture, and other elements of the game. This is one of the ways that Minecraft, through its design, becomes a social experience, largely dependent on the surrounding community for guidance.

As mentioned before, Minecraft is often referred to as a *Sandbox* game. Gee's definition however, differs from the typical sandbox ideal. A sandbox game is commonly one that allows players to freely move around the world and follow different tasks, rather than a traditional, linear storyline. In Gee's eyes, however, a sandbox is defined as "game play much like the real game, but where things cannot go too wrong too quickly or, perhaps, even at all." While this isn't present on the vanilla, offline version of Minecraft, it is present on some online servers of the game. One server, Desteria, is faction based with an in-game economy. In servers such as Desteria, it could be argued that the server-wide in-game chat can function as a sort of sandbox to the user. The player has the chance to hear the interactions of the others on the server before directly interacting with them, when they can later be in front of those who are talking and understand how to interact with them. In cases such as player-vs-player combat, this intel is especially important to the player and provides some leverage to an otherwise inexperienced player.

Because Desteria takes the basic, vanilla version of Minecraft and adds different mods to the game to create more of a traditionally MMO-style gameplay, other principles set forth by Gee become prevalent. One principle that isn't as prevalent in offline, vanilla Minecraft is the idea of *Manipulation and Distributed Knowledge*. Gee claims that “humans feel expanded and empowered when they can manipulate powerful tools in intricate ways that extend their area of effectiveness.” Desteria is one of many servers that has an in-game economy. Desteria's specifically is run off of an auction system. Through this auction-based economy, players not only see themselves as an in-game agent and a member of the server's economy, their identity is reinforced through interactions with others on the server. The player feels empowered by selling objects to others to get what they need. Through this economy, players not only have a chance to receive the materials that they need from other players, but they also form a sense of identity with themselves and with the other players on the server.

Whenever there's an online community for a game, it is important for players to be able carry with themselves a sense of identity in the virtual space. An identity, according to Gee, helps “trigger a deep investment on the part of the player.” Minecraft enables players to play with their identity in many different ways. Players can upload any “skin” that they desire to change the look of their in-game player model. Beyond that, players can wear different types of armor (leather, golden, chain, iron, and diamond) to not only protect themselves from other players and mobs, but also to display status. It is common on certain Minecraft players to have leaderboard and public ranks for players to see “who's on top” of the current server, whether it be economically, skillfully, or otherwise. These ranks give players a place in the virtual world and also give them a benchmark to aspire to.

Although Minecraft does not follow the same traditional gameplay models many blockbuster titles, through it's subtle underlying system and expansive online play, Minecraft is able to offer something for everyone. Players around the world have been captivated by Minecraft's gameplay structure. Whether it's the way that Minecraft gives players an active role in their learning process or how it forces players to employ systems thinking, Minecraft's design has been a resounding success.

Minecraft as an Educational Platform

With headlines such as “*Could Minecraft be the next great Engineering School?*” (Quartz, 2012), it’s hard to imagine that an educator wouldn’t be considering how Minecraft could bring big opportunities for learning and engagement in the classroom. As educators increasingly struggle to compete with captivating students, Minecraft may offer a solution to bridge the gap between state-mandated standards such as Common Core and interesting and meaningful lesson plans. As echoed in the *Scientific American*, Minecraft is an “excellent platform for making almost any subject engaging.” According to a study done by PBS LearningMedia in 2012, the top three reasons that teachers want more technology in the classroom is to increase student motivation, to reinforce and expand on content being taught, and to respond to a variety of learning styles. When a game that already has amassed a large following from children and teens at home is brought into the classroom, students will become more motivated and will be learning on a platform that they’re already familiar with. Learning starts to become more natural and nuanced, much like how the players in Steinkuehler’s analysis on *World of Warcraft* communities responded when asked if they were learning or not. The more students can forget about education as an institution and start to think of it more as a personal quest, the more students are willing to continue their learning on their own accords and the less apt they are to protest in the educational setting.

We know that Minecraft can drive engagement in the classroom, but what makes it different from previous educational successes like *Oregon Trail*, *Reader Rabbit*, and *Carmen Sandiego*? Mimi Ito’s article titled “*Why Minecraft Rewrites the Playbook for Learning*” outlines four aspects of Minecraft that herald Minecraft as a champion in the classroom. First, she says, is the fact that Minecraft is “the first massively mainstream learning game.” Over the last 30 years there have been games like *SimCity* and various *Broderbund* titles, but none has had mainstream commercial success like Minecraft. Currently sitting at the number three all-time best-selling game in the world, Minecraft is as well known to kids as *Mario*, *Sonic*, or *Zelda*. Because of this, most students already have a pre-existing knowledge of the gameplay mechanics and the culture of the game.

The second reason why Minecraft rewrites the playbook for learning games, according to Ito, is that “kids build stuff together online.” She argues that most educational platforms try to convey content instead of creating it. “Minecraft is about constructing and problem solving in a networked social world,” says Ito. This is starkly different from previous examples such as Oregon Trail and Carmen Sandiego; players are actively encouraged to build their own content and to do so socially, much like in a way that students prepare for and ultimately take tests. This cycle, however, has a much quicker feedback loop than the process of learning a lesson over a two-week period and then testing students on the topic at the end of that process. In Minecraft, students are able to have an idea, start building the framework, look online for different techniques, and ask others for feedback or help. This process is blended and doesn’t involve any cramming, late-night frustrations, or lapses in communication. Students become more of an agent in their learning and start to understand social relationships along the way.

The third reason, according to Ito, is that Minecraft offers “endless ways to level up.” True to its open-world nature, Minecraft offers something for everyone, from young to old and from adventure-seeking players to creative builders. Kids can get into Minecraft as young as age 4 or 5, often starting with the “Pocket Edition”, and carry their experiences with onto the PC version and later to different Minecraft servers. Kids rarely play Minecraft as a solo experience; many kids and teens take part in an online community to extend their game into a community experience. Players often look up to prominent YouTubers to see what they’re making, what experiences they’re having with others online, and how they’re playing the game themselves. In Ito’s words, “there is always something to be inspired by, a mentor to seek out, and a way to level up or branch out.”

The last reason that Ito gives is that “servers are player-operated.” Minecraft is unique in the fact that players can download the server runtime and host their own servers, something that was never available in other online worlds such as Second Life or World of Warcraft. This takes Minecraft past being just a place for digital creativity but also for social innovation. Server hosts can govern their own rules on the server and create a set of rules based on their own values and ideals. Server hosts can also dictate the style of play that they want to construct, which is in stark contrast to other games where the play environment is based on whatever the corporation

decides. It rightfully claims that both server administrators and players start to learn lessons in digital citizenship through this structure. Players learn what a good leader looks like, they learn the hierarchy of different social systems and how to fit into them, and most importantly, they learn how to interact with other people.

In order for schools to keep up with student engagement, they must employ new techniques and platforms like Minecraft. According to Charles Kerchner, districts should not only integrate Minecraft into their curriculum, but they can also learn a great deal from applying Minecraft's play styles to different issues in this country's educational system. "In Minecraft," he explains, "the key to learning is to connect with people who already know how to play the game. As in Minecraft, the design challenge is to create networking opportunities that attract use." He equates the common struggle that teachers do not share a collective experience to the community in Minecraft. Teachers should be as unified as players of Minecraft are in their experience so they can better pool their efforts and knowledge amongst themselves. As it turns out, both educators and students alike can learn from Minecraft.

Interestingly enough, Minecraft-based curriculum has been around since 2011. One of the pioneers in the space has been Joel Levin and his company, TeacherGaming. TeacherGaming runs the most successful database of Minecraft-based curriculum on the internet. Levin started teaching his students using Minecraft-based curriculum in 2010. He coded a mod for Minecraft that removed some elements that were unnecessary, such as player-vs-player combat, and added some features to aid his designed curriculum (Ossola 2015). When he had the modified version of Minecraft that he set out to create, he let his class into his designed world. The effects of the game had farther reaches than he had originally thought: "Levin's students learned more than just the hard skills he had intended for them to they pick up—they were also having profound discussions about topics that were notoriously challenging for teachers to communicate effectively" (Ossola 2015). Students weren't just learning about the lesson at hand, but also about dealing with complex social interactions with each other in the game. Playing Minecraft didn't just increase social awareness for the students, though. Students were indirectly increasing their abilities for spatial knowledge, which later improves their aptitude for math and science (Ossola 2015).

Levin now has a huge database of teacher-created content on his MinecraftEdu platform. Now, teachers can go online and search from 120-plus pre-made lessons that can fit into their own curriculum. One teacher in San Jose, Diane Main, has been using Levin's platform for the past two years. To her, Minecraft offers students a different way to handle problems that have traditionally been hard for students to grasp or visualize. "When you have opportunities for creativity and more open-ended situations, it allows kids to figure out that they can try things, they can do things differently—there's not one formulaic way to do well in this class." (Ossola 2015).

Overall, Minecraft can not only give players a lightweight learning environment at home, but can also help educators foster engagement in the classroom. Compared to previous attempts to bring technology into the classroom, Minecraft truly has the ability to keep students engaged (Webster 2011). Besides driving engagement, Minecraft also prepares students to deal with issues such as social consciousness and acceptable behavior. "Hopefully they will remember some of these lessons when they finally get Facebook accounts a few years down the road," says Levin (Webster 2011).

Minecraft as an Online Community

We've seen how Minecraft is a learning environment in the home and in the classroom, but because of its huge player base and open-world based gameplay, a huge online community has amassed around the game. Minecraft's community can be found across many different homes on the internet, from various server-specific forums, to the general MinecraftForum, to the Minecraft Subreddit community and the Minecraft community on YouTube. According to a study done in December 2014, Minecraft videos account for 62.7 billion views on YouTube (ReelSEO 2014). Not only do Minecraft-related videos have large amounts of viewers, but they also have relatively large levels of engagement. At the time of this writing, the top hit for the term "Minecraft" on YouTube is a video that was posted one day ago and has amassed over 670,000 views. Some of the top YouTube personalities got their start by creating Minecraft-related videos. Some of the most prominent YouTubers that cover Minecraft are TheDiamondMinecart, Sky Does Minecraft, TheAtlanticCraft, Yogscast, Pewdiepie, and Coestar.

Using Gee's concepts and attributes of an affinity space, we can start to analyze the different communities of Minecraft and look at these communities through the lens of an affinity space. Many YouTubers post "Let's Play" videos, which are just them playing the game, often presented in a series of videos. Another type of video that YouTubers post showcase videos for different mods for Minecraft. In Gee's terms, this is an example of a *generator*. A generator, according to Gee, is something that creates content to be consumed within the space. The same users that play Minecraft are also the users that generate content for others players to use in their own games. In some regards, these mods are also portals to new forms of play and learning because they offer new forms of interaction with the game. In another sense, the prominent YouTubers also act as portals, as they are the lenses through which some players view the world of Minecraft. Some viewers don't even play Minecraft, but get entertainment out of watching others play, similar to how some people watch Food Network but don't ever cook. Between all of the different affinity spaces of Minecraft, the YouTube community may be the one that poses leaders as resources the most. Users like Pewdiepie are universally known amongst the Minecraft community and are not only seen as leaders in the community, but also as someone that can be easily accessed and someone that offers valuable insight to the broader community.

Another large community for Minecraft players is the Minecraft Subreddit (r/Minecraft). The Minecraft Subreddit is home to 450,000 subscribers and is a mix of images, Minecraft-related news, and assorted mods. Of all of the Minecraft communities online, the age is the oldest, where most users are 20+ years old. Many users share their Minecraft creations, which reinforces the idea that every Minecraft player is a generator at some point. If a player creates something great in Minecraft and shares a picture of it, the other players will want the map of their creation, in our case a *portal*, to experience what the user has created for themselves. Another Subreddit, r/MinecraftBuddies, offers a place to find other players to play Minecraft with, based off of their interests and their age grouping. This Subreddit acts as a portal to different Minecraft experiences, most of which are social. The goal of this Subreddit is to pair the right people together in order to create a good group of people that will learn and play well together and create a great, functional affinity space. Overall, these two Subreddits encourage distributed knowledge: as users post looking for help installing something or for

recommendations on what Minecraft player to watch on YouTube, the community reinforces itself and benefits the overall quality of the community and creates a larger library of help for both new and returning Minecraft players to reference.

The modding community in Minecraft is not one to be ignored. One of the best places to find players of the type is on MinecraftForum, the largest forum for modding and servers in Minecraft. MinecraftForum is home to 4.2 million posts about Modding and 3.3 million posts about PC Servers. The Modding posts often start with a main post made by the developer of the mod, showing a brief overview of their mod, any recent updates to the mod, screenshots of the mod, download links, and videos of the mod in action. These videos are often videos done by prominent YouTubers using their mod. This brings the community full-circle, where the players see the video on YouTube and then go to the forum, and likewise see the mod on the forum and see the YouTube video on the forum page. This creates a great learning environment because the same concept is recalled through many different avenues in the space, and players can quickly become an expert of a certain mod or form of play. Only furthering the loop of knowledge transfer, other users sometimes post their videos showcasing the mod to the mod's page on the forum, which is related to the concept of *encouraging dispersed knowledge*. The very nature of the forum brings users together around a topic and lets them share their own opinions and creations within the realm of a certain topic. Often on these forums, newbies and masters share the common space and come together to critique the mod or server from all ends. The power is dispersed throughout the community, and the masters rely on the newbies and their input to create a great experience.

If we look at the server of a specific Minecraft server, in this case *Desteria*, we will find even more examples of Gee's features of an affinity space. Desteria is a faction-based server that features an in-game economy and clan system that replicates a traditional MMO. The Desteria forum allows players to apply to be staff members of the forum and server. Once again, this relates to the notion that *Leadership is porous and leader are resources*. The community puts candidates through rigorous questioning and background checks to make sure that the person applying would make a good fit to lead the rest of the group and be a good resource to the rest of the players. As with many MMO-style games, the interaction with the server doesn't end when

the player logs out. The conversation is carried out on the forum when the player isn't playing and continues to the server when the player is online. The forum is a place where newbies and masters and everyone else share a common space and every player is reachable, no matter their in-game rank.

The more the community puts into itself, the better the experience will be for everyone. Through this cycle, Minecraft as a whole has expanded from a simple game to an enormous community of storytellers, hackers, and entertainers. Minecraft has been able to appeal to a large amount of players from a variety of different backgrounds and has created great communities built of those ideals. Gee's 11 features of an affinity space are all present in some form or another throughout the different online Minecraft communities, and that's what makes them great.

Minecraft as a Childhood Social Space

Minecraft, unlike many other children's games, gives kids a way to start to understand the slight nuances in social behavior through experiential gameplay. Because parents or educational institutions can run their own server, it is easy for them to control the variables of the virtual environment and give kids a chance to play with their friends or peers in a safe, low-risk way. Minecraft enables players to be civically engaged (Ito 2015) and makes kids socially conscious in a way that most games cannot. Students must "share resources, take turns, work together, and frankly, be nice to each other. This is usually the first time these kids have had to think about these concepts in a game" (Ossola 2015). Children can develop social skills that will transfer from the virtual world to the real world seamlessly and will give them a nice introduction into future social spaces, both real and online. Traditionally things like recess and extracurricular activities are the some of the first social spaces for children, but as kids are growing up online, Minecraft may be their first foray into social interaction. Kids are able to learn about digital citizenship, which is especially important as it becomes more of a cultural norm for teens and young adults to jump onto social media immediately after they're of age.

Minecraft and its success in being the third most purchased game in the world has caused educators to take a second look and become inspired to bring technology into the classroom. Minecraft separates itself from prior technology-education pairings because of the opportunity for curriculum design and engagement that it brings to the table. Minecraft, being labeled as a sandbox game, has brought many advantages to the field of education. It can be changed and extended into something that best fits the player and their style. The game can also be changed into something that best fits the player's learning style, which draws huge benefits when moving into the classroom. Minecraft has been looked at as an educational platform since 2011, and ever since then, educators have been able to quickly experiment with bringing Minecraft into different subjects, like science and even reading, to drive student engagement. The very nature of Minecraft also gives the player a rich learning environment on its own as well. Minecraft's design gives the user a little knowledge as to what to perform initially but later lets the player run off and follow their own path. Lastly, Minecraft gives children and teens the tools to become socially aware young adults, allowing them to easily interact with other players in a set environment. Players can take their fandom online and create a supplementary experience that turns the game into something that will offer a lifetime of entertainment and growth. Most importantly, Minecraft offers a platform for kids to think of problems differently: "A student told me after the class that he learned that first option [to solving a problem] isn't always the best option. And that's something you can't teach kids—they need to have the opportunity to experience it themselves" (Ossola 2015).

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