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Minecraft as a didactic tool

AUTOR: Castrejón Muñoz Maximiliano

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Abstract

Minecraft is the most sold game worldwide as well as one of the most spread through all the world. Having a growing number of players and resources, teachers shall capitalize the reach it has, specially through students in primary education.

The objective of this work is to develop a tool that is intuitive and engaging for the children but at the same time is useful for the teacher to teach contents no matter the subject to teach.

By taking advantage of the popularity of this game as well as active methodologies such as project-based learning and game-based learning a tool for learning that is motivating while unifying every subject and improving social skills can be created. To do so a review of previous lines of work was made, and after analyzing the information an innovation proposal was elaborated, combining the proposed ideas of other lines of work with some game mechanics unexplored a set of activities has been elaborated regarding every subject in an elementary school. Using the survival aspect of the game promotes cooperation, social skills and empathy, making activities an engaging challenge that gives them the intrinsic motivation to improve themselves and do better while the creative aspect let them explore the endless possibilities where the only limit is their imagination, promoting thinking “out of the box” to create unique solutions to a problem from the real world.

As a result, Minecraft is a tool to corelate contents among subjects as well as improve social skills and relationships among peers.

Resumen

Minecraft es el juego más vendido en todo el mundo, así como uno de los más difundidos en todo el mundo. Al contar con un número creciente de jugadores y recursos, los docentes pueden capitalizar su alcance, especialmente a través de los alumnos de la enseñanza primaria.

El objetivo es desarrollar una herramienta que es intuitiva y atractiva para los alumnos, pero a su mismo tiempo sea útil para el profesora para enseñar los contenidos sin importar la asignatura a impartir.

Tomando ventaja de la popularidad del juego y también metodologías activas como el aprendizaje basado en proyectos y aprendizaje basado en juegos una herramienta para el aprendizaje que es motivadora a la vez que une las asignaturas y mejora las habilidades sociales

puede ser creada. Para ello una revisión de líneas de trabajo previas fue hecha, y tras analizar la información una propuesta de innovación fue creada, combinando las ideas propuestas con otras líneas de trabajo con algunas de las mecánicas del juego sin explorar un conjunto de actividades ha sido elaborado sobre todas las asignaturas en una escuela primaria. El uso de la característica de supervivencia del juego promueve la cooperación, las habilidades sociales y la empatía, Hacer de las actividades un desafío atractivo que les dé la motivación intrínseca para mejorar y hacerlo mejor, mientras que el aspecto creativo les permite explorar posibilidades infinitas donde el único límite es su imaginación, promoviendo el pensamiento "fuera de la caja" para crear soluciones únicas a un problema del mundo real.

Como resultado, Minecraft es una herramienta para correlacionar contenidos entre asignaturas, así como mejorar las habilidades sociales y las relaciones entre compañeros.

Key words

Minecraft, Cooperative learning, Game based learning, cross-curricular content and motivation.

1. Introduction

Videogames have come a long way, in 1958 the first iteration of a videogame was created, but it wouldn't become the massive industry it is today until 1970, when games started to develop thanks to Atari creating the game known as "Pong", and later reaching to the home of people all around the world (Kaufman, 2022).

Nowadays games have developed from simple pixels to an astounding world full of wonders, where the players are main characters of their own stories, developing several categories from arcade games representing the classics played on arcade machines such as "Pac-Man" or "Space invaders" to visual novels which are more similar to a book or a comic which it's only mechanic is to choose between several options in certain moments that will impact the story to continue, such as "Umineko no Naku Koro ni, 'When the Seagulls Cry'" or "Doki doki literature Club", giving more emphasis on reaching the player through their stories.

The term Sandbox comes from the sand boxes in parks to let children create whatever they want. Therefore, sandbox games are those in which players can build or create whatever

they want, Giving the player infinite possibilities when playing them without following a set story or even creating their own. Another main difference regarding other type of games is that they are endless, meaning that even after completing the main objective of the game set by their creators they can still keep playing and creating.

Students can benefit from this type of games by developing their creativity in controlled virtual environments because they can create whatever they want without the input of the teacher, giving them inner motivation and autonomy in a way traditional classrooms can't compete with and they develop their social skills too, as these games allows several players in the same world.

2. Justification

This project aims to use a sandbox videogame in order to combine different aspects of the curriculum, linking the different areas and competences and finally unify the school work with the leisure time of the student.

Videogames are widespread among children, according to (Miguel & Gomez, 2023) the average age in which children start playing is 10 years old, and it can be observed that the age is being reduced. As teachers we have the necessity of guiding the student, not only in the subjects but in the responsible use of resources so we have to afront the reality that is growing unattended, especially since this study doesn't take into account younger students that started playing videogames during the pandemic as the investigation was made asking teenagers and during my internships period at the school, it has been seen how 2nd graders are already playing with consoles.

According to Andersen & Rustad (2022) we can use this game to develop 21st century skills as well as logic-mathematical competences through collaborative learning and active methodologies, while the work of Ekaputra et al., (2013) uses some of the games mechanics to work in environmental awareness and as a scientific cultural and social tool for learning.

3. Objectives

The main objective of this proposal is to make an innovative didactic proposal using mainly Minecraft as a tool for teaching as well as a social motor.

According to the *Boletín Oficial de la Comunidad de Madrid of 18 of July of 2022*, the objectives to accomplish during elementary education are:

to know and appreciate the values and norms of coexistence, learn to act in the other's place, prepare for active citizenship and respect human rights, as well as their participation in a democratic society; to develop individual and team work habits, study effort and responsibility, as well as attitudes of self-confidence, critical sense, personal initiative, curiosity, interest and creativity in learning, and entrepreneurship; to acquire skills for the peaceful resolution of conflicts and the prevention of violence; [...]; to know, understand and respect different cultures and differences between people, equal rights and opportunities for men and women, and non-discrimination of people on the basis of ethnicity, sexual orientation or identity, religion or belief, disability or other conditions; [...]; to acquire, in at least the English language, basic communicative competence that enables them to express and understand simple messages and to deal with everyday situations in this language; to develop basic mathematical skills and become familiar with problem solving, which require basic calculation operations, geometric knowledge and estimation, as well as the ability to apply these to everyday life situations; to develop basic technological skills and begin to use them for learning, developing a critical mind about their operation and the messages they receive and elaborate; [...]; to develop their emotional abilities in all areas of personality and in their relationships with other people, as well as an attitude against violence, prejudice and stereotypes of any kind. (p.17-18)

With these objectives in mind the objective of using Minecraft as a didactic tool are to first and foremost to cultivate cognitive and positive social skills with their peers and social environment, to make them see the tight relationship among subjects with one another and with the life outside schools and to develop technological and 21st century skills.

Other objectives to be accomplished are to link house and school, making learning constant and significant; to build a healthy relationship between the students and the videogames and technology and to make the learning process as ludic as possible without losing sight of the contents and competences

4. Theoretical framework

4.1. Definitions and key aspects

Before continuing it is necessary to set certain definitions and aspects for the reader to fully understand the project and to clarify the usage of some of the words.

4.1.1. Definitions and Terms.

The players are the users, in this case the students, that will play and experience the game.

The mobs are the non-playable characters that roam the world, they can be peaceful, neutral or hostile. The apparition of hostile mobs can be deactivated by changing the difficulty of the game to 'peaceful'.

World refers to the virtual environment which the player can create and influence through several means, being so by changing parameters set by the game itself or by directly creating and destroying at their will.

The word Server will be used referring to a world where two or more players can influence it.

Build is a construction made by the players in the world, opposed to a structure which are artificial structures premade by the game itself.

Finally, there are some other terms such as "in-game" and "spawn point" that are self-explanatory, however as a reminder the first term is referring to making or doing something inside the virtual space or game to summarize, and spawn point refers to the coordinates $xyz=0, \sim, 0$ where y doesn't matter as it refers to the height and contrary to reality sea level is not height 0.

4.1.2. Theoretical aspects.

4.1.2.1. *Technological pedagogical content knowledge*

Technological pedagogical content knowledge or TPACK is according to Koehler and Mishra (2009 p.66):

TPACK is an emergent form of knowledge that goes beyond all three “core” components (content, pedagogy, and technology). Technological pedagogical content knowledge is an understanding that emerges from interactions among content, pedagogy, and technology knowledge. Underlying truly meaningful and deeply skilled teaching with technology, TPACK is different from knowledge of all three concepts individually.

The content knowledge is the matter the teacher knows and have to be taught during the school hours; The Pedagogy knowledge is the teacher’s knowledge involved in the process of teaching and learning in a classroom and technology knowledge is the knowledge of how to use technology and ways of thinking about technology.

TPACK is not just the combination of the three. According to Koehler and Mishra “TPACK is the basis of effective teaching with technology, requiring an understanding of the representation of concepts using technologies; pedagogical techniques that use technologies in constructive ways to teach content; knowledge of what makes concepts difficult or easy to learn and how technology can help redress some of the problems that students face; knowledge of students’ prior knowledge and theories of epistemology; and knowledge of how technologies can be used to build on existing knowledge to develop new epistemologies or strengthen old ones”.

According to Santos & Castro, (2021, p.1):

Technological Pedagogy Content Knowledge (TPACK) is a theory that was developed to explain the set of knowledge that teachers need to teach their students, to teach effectively, and to use technology. It attempts to identify the nature of knowledge required by teachers for technology integration in their teaching, while addressing the complex, multifaceted and situated nature of teacher knowledge. This framework extends Shulman’s idea in 1986 of Pedagogical Content Knowledge in the study of Koehler & Mishra in 2006.

In essence, TPACK is not only about how the student learns, it is also about how the teacher shares its knowledge in an engaging way, making technology something as natural in a classroom as a pencil or a book, improving how the teaching is made.

Needless to say, using a game, specially one as complete as Minecraft is effectively using technology to not only gain effectiveness in the use of technologies but also learning

several aspects that the teacher will boost and guide to make the learning process complete and significant.

4.1.2.2. *Game-based learning*

One of the most recent paradigms shifts in education is the inclusion of activities that motivates the student with an apparent ludic objective while actually leading to learning the contents. This includes the adaptation of popular games to actually teach something.

However, nowadays students have more access to technology and videogames than a few decades ago, and traditional games are slowly being replaced with videogames by students out of school, so teachers have to adapt to these changes.

According to Squire, (2006) “If a hallmark of games is their interactivity, their ability to grant players agency within the narrative fiction of the game world and its rules, then theoretical models need to account for players' actions in creating the experience.” This statement refers to opposed to the aim of the games, players are the ones that give the true purpose to the world they are playing and that theoretical models need to take into account how the players can interact with the game instead on how they want to interact with it. This relates to the teachers being also players that can mold the experience, guiding the students through an experience, giving the students the freedom to discover by themselves, giving them motivation and significant learning since they build from their own knowledge rather than just being passive listeners. Even so this approach means that the teacher has to worry on how to choreograph the experience instead of how to achieve control, the objective is to guide, not to command.

Another core aspect of videogames is the need of doing, contrary to a film or a book, interaction among game and player is the base of a videogame. Players' first instincts when starting a game is to use every key they know and see what happens, learning what they can and cannot do. For instance, usually for moving instead of the arrows, the keys w-a-s-d are used for movement and space for jumping or interacting with objects. Sthe key shift can be fir running or crouching and control the other movement. Other keys and buttons may be used for other actions, but only by doing the player can understand how the new world works. Also, visual cues are important for the player to understand, similar to traffic signals, game signals are to be interpreted and acted upon if necessary, and once they integrate this knowledge, the

hybrid of avatar and player is born, whereas the avatar is the virtual manifestation of the player. These signals don't need to be from the games, for instance, if a teacher limits a zone for building using a specific block or light, students learn that they can't get out of it while building.

Other aspect to take into account is the social learning involve, especially, in massive multiplayer online games (MMO), where players can experience new roles semi anonymously, they can influence their environment and they are known by their actions and behavior inside the game. In this kind of game players also share information about what they know, in some cases teaching new players some aspects that the game does not explain. Needless to say, how an environment like this where there is no base discrimination where everyone can learn from each other is extremely good for students, creating their own community rather than just a shared virtual space.

Sandbox games, albeit not as big as MMOs, they are heavily oriented to what the players do and how do they interact with the environment, and some of them creates communities that surpasses even those of MMOs. A great example of this is Minecraft, nowadays players can enter different servers according to what they can do, arranging from just plain survival, to playing several minigames made by the community within this game. According to the Guinness world record, the most simultaneous unique players connected goes to Hypixel, with 11,982,298 different accounts. This server counts with one of the most complete arrange of options in a server, having competitive and cooperative minigames, as well as different survival options, actually it is one of the biggest communities within the game. Although a server this massive is hardly the objective of a teacher, it proves the sheer potential of sandbox games as a tool, being so by integrating the learning experience with the student's joy or the construction of a community where they can interact with other players.

4.1.2.3. Constructivism

According to (McLeod, 2024)“The work of Lev Vygotsky (1934, 1978) has become the foundation of much research and theory in cognitive development over the past several decades, particularly what has become known as sociocultural theory. [...] Vygotsky believed cognitive development is influenced by cultural and social factors. He emphasized the role of social interaction in the development of mental abilities e.g., speech and reasoning in children.

Vygotsky strongly believed that community plays a central role in the process of “making meaning.”

Cognitive development is a socially mediated process in which children acquire cultural values, beliefs, and problem-solving strategies through collaborative dialogues with more knowledgeable members of society.”

The work of Vygotsky is still a great influence transcending time from a teacher’s perspective, it’s the essence of countless theories and advancements in education and cognitive development. His theory made clear the social factor involved in learning, interacting with more knowledgeable peers leads to not only learning but also to develop high-order mental functions. Adults foster this development by engaging them in challenging and meaningful activities. He stated several concepts but I’ll be focusing on the zone of proximal development and scaffolding.

Zone of proximal development are the different areas of knowledge separated in concentric areas with the student in the middle and separated in three: What they can learn on their own, what they can learn with the help of others and what they cannot reach yet. It’s the gap between what the children can do on his own and the potential it can reach. Modern methodologies and theories focus on how peers can help mutually and the teacher instead of being the active part of the classroom is a guide. They use the peers as the agent to take them out of their inner area to accomplish harder tasks.

Scaffolding on the other hand is the use of support frameworks to promote creation in the target language, and as they progress the support provided by the teacher becomes less and less.

These concepts are to be applied when using sandbox games as a tool, mainly because with the help of peers they will be able to reach further heights when accomplishing an assignment, not only because there are more hands at work but also because they are able to bounce ideas, share experiences and challenge themselves to do better. It is vital for assignments in this kind of games to make a framework to help them focus on the task, after all, one of the main characteristics of this games is to have as much freedom as possible, and is the task of the teacher to focus that freedom to meaningful activities.

The use of a cooperative multiplayer game such as Minecraft work as a bridge between peers, where the most advanced ones can teach and guide the ones struggling in a natural way,

and since several aspects are on display during each project, every student will have the chance to shine and be the guide, creating deeper bonds between them while reaching the zone that needs the help of others.

Scaffolding on the other hand works simply by turning the game to English, giving them vocabulary that they will be interacting with. Giving the students sentences to complete regarding their buildings such as “I’m building with…” or “To obtain… I need to…” we are already working and improving grammar while using vocabulary learnt in the game so they can later extrapolate them to other situations.

4.1.2.4. Studies using Minecraft.

Despite being barely 15 years old, studies have already been made regarding this game and the potential it has for the teaching community.

The work of Ekaputra et al., (2013) talks about how different aspects of the game can be applied to different subjects and topics taught in schools. They mainly focus on ecology, using the biomes of the game, redstone as electrical engineering of the game and computer science, the mechanic of breaking and placing blocks as cultural architecture and dimension orientation and multiplayer as social learning, ending with the quote “As an educator, Minecraft world can be fabricated at will to fulfill an environment which has positive effects to students learning process” (Ekaputra et al., 2013 p.241).

This work however is quite outdated, taking into account that was made barely 3 years after the first stable version was released and 11 years had passed since then. For instance, regarding the biomes their generation has changed significantly, before the biomes generated randomly in the surface whereas now, they implemented a system classifying biomes as warm, temperate and cold; and in the caves there are also different biomes based on height and uses some geological formations such as stalactites and underground lakes even changing the type of rock found according to height.

Other interesting work is the one made by Andersen & Rustad, (2022) which introduces some interesting concepts such as Computer-supported collaborative learning (CSCL), combining collaborative and technical perspective that are growing more and more important in today’s education picture. They provide a new way to interact with others as well as a shared environment that fosters interactions which develops learners’ new understanding in the areas

of learning. They also use Minecraft and CSCL to study relational ties among students since students are collaborating towards a common goal.

4.1.3. Sandbox games

Sandbox games are a genre of videogames that provide players with a high degree of creativity and freedom to interact with the game environment. They usually feature open-ended gameplay allowing players to set their own goals and pace to reach it.

They feature different characteristics, being so:

- Open-world environments: Players can explore different worlds generated procedurally with almost no restrictions, these environments typically include diverse terrains, resources and elements which may help them reach their own objectives.
- Non-linear gameplay: There are no set paths or predetermined sequence of events so they are free to pursue their activities and objectives at their own pace
- Creative freedom: Players can build, modify and destroy objects within the world, including mechanics of crafting and building.
- Emergent gameplay: Player's actions can lead to unplanned and unique outcomes because the environment reacts dynamically to player interactions

Modding and customization: Many sandboxes allow mods, which are modifications of the game not made by the developers of the original game, allowing players to alter or expand the game, and customization options are usually available to personalize their avatar or game experience.

These games encourage students to think creatively and develop innovative solutions to their problems, building or designing game elements promote artistic expressions and design thinking. They promote collaboration and social skills, vital for primary students, through multiplayer modes and by working together on projects.

Many sandbox games involved programming, logic and computational thinking, and they can be introduced in various subjects, providing a platform of project-based learning and real-world applications.

For Implementing them in the classroom first it is necessary to align these activities with the curriculum and use them to provide hands-on experience. It is necessary to design projects that require students to use sandbox games to solve real world problems, encouraging them to present their creations so they can help their peers as well as receive feedback, and finally teachers need to be formed in these games and its mechanics.

4.2. Minecraft

Minecraft is the main tool used in this proposal. There are three games with very similar characteristics so specification is needed. Once you buy from the store Minecraft you can access to Java edition and Bedrock edition. Albeit similar, these two have key differences to take into account.

Minecraft Java Edition and the one we will be using is the one that has been being developed since the release, making it the most widespread, it is playable exclusively on PC, and since it has been for the longest time it has the most amounts of modifications (mods), texture packs and resource packs including shaders. Mods will not be used during this proposal; however, texture packs can be used for the student can be used to give new textures to blocks, mobs and even the sky, from night skies realistic with constellations to just a texture pack to mark better the border of blocks to better count them in some activities, they don't impede the player to join the school server. When referring to Minecraft in this proposal it is being referenced this Edition.

Minecraft Bedrock edition was fully in 2016, the main advantages it has are the possibility to connect to the same edition but from console, avoiding the PC exclusivity, however the amounts of mods and texture packs are limited and some are even paid content, so the possibility of customizing the world for both teacher and students is seriously limited.

Finally, Minecraft Education is the version created with the intended purpose of being used in classrooms. Later it will be developed in further depth but the reason Java Edition is being used instead of Education Edition is because children are more familiar with the latter being so because influencers playing it or being the most popular option since the former can only be acquired through the page whereas the other can be obtained in Microsoft and Xbox online store.

Needless to mention the activities can be adapted to any of the versions at the teacher's will with no overwhelming complications.

4.2.1. Minecraft Java Edition

According to the article published in the official webpage by *Landin (2023)*:

Minecraft is a game made up of blocks, creatures and communities. Blocks can be used to redesign the world or build fantastic creations. Minecraft has no set goal and can be played however you'd like! This is why it's sometimes called a "sandbox game" – there are lots of things for you to do, and lots of ways that you can play. If you like being creative, then you can use the blocks to build things from your imagination. If you're feeling brave, you can explore the world and face daring challenges. Blocks can be broken, crafted, placed to reshape the landscape, or used to build fantastical creations.

It is a game thought to give as much freedom to the player as possible, with four play modes being 'survival', 'spectator', 'adventure', and 'creative'.

Survival is the basic play mode, resources have to be harvested by hand or by building farms, taking care of the hunger and health bar. Building is unlimited as long as the player has harvested enough blocks and materials to back up the building.

In spectator mode players can pass through blocks and fly, and their hunger and health bar are non-existent. This mode is useful to look at builds without being stuck to the ground.

Adventure mode is similar to survival mode with the difference that it is impossible to break blocks and is used for playing in worlds made by other players but where breaking blocks would spoil the experience, for example worlds thought to be an adventure or a certain challenge.

Creative mode is the complete opposite of adventure, where the player can fly, break and place blocks at will without the need to gather them, picking them through an especial inventory, without hunger or health to worry about. Also, hostile mobs don't target the player. This mode is useful if the only objective is to build something without having to stop to recollect resources.

The game world loading system is loading boxes of 16 by 16 blocks, called chunks, surrounding the player, reaching certain distance depending on the specification of each player, however some chunks stay always loaded without the need of the player being near, being these the ones, the player spawns the first time it enters the world.

The world is measured using coordinates in three dimensions, using x, y and z axis. It is not endless, having the minimum height of $y = -64$ and the maximum height of $y = 320$; and the horizontal distance from the coordinates $0, \sim, 0$ is up to 60.000.000 blocks.

Each complete block is equivalent to 1 m^3 .

The inventory consists of 4 armor slots, 27 storage slots, 9 hot bar slots, and an off-hand slot. Items in the hot bar slots can be selected during play using the keyboard (keys 1–9) or mouse wheel and placed or wielded with the mouse buttons. In each slot, up to 64 of the same items can be stacked, with the exception of armor, tools, potions and special items.

4.2.2. Minecraft Education Edition

Minecraft education is a game-based learning tool provided officially by Minecraft focused on school. It is a version of the game with the same name for educational purposes, with unique features and tools suitable for the classroom use, allowing immersive learning experiences. The features present in this edition that makes it especial are:

- Classroom mode which provides a companion application for educators to manage setting, communicate with students and control the game environment in real time, allowing them to teleport students, set world spawn points and manage inventories.
- Integrated code builder through platforms like MakeCode and Tynker, where students can write code to automate tasks, create mods and build structures.
- A library of lesson plans and resources created by educators around the world with all the subjects.
- Enhanced multiplayer Capabilities with support of up to 30 students in the same world, encouraging teamwork through shared projects and problem-solving tasks.

- Immersive environments through templates and pre-built worlds for specific lessons and activities like ancient civilizations, space exploration, ecological biomes and historical landmarks
- Assessment tools in-game and exportable portfolios to document student work, allowing teachers to track progress and providing feedback

5. Innovation proposal: Minecraft school tool

This innovation proposal will consist on creating a Minecraft server that will have two separate worlds, one for survivals so students can interact with one another, gather resources, build and so and another world in creative mode to build and make most of the tasks. The survival world will provide a way for the to interact and help each other, enhancing social relationships.

As mentioned earlier, the studies of Ekaputra et al. (2013) and Andersen and Rustad (2022) already used Minecraft as an educational tool, with success in their objectives. However, they focused on small areas compared to the whole curriculum in education as well as learning not coming from the books, such as empathy, solidarity and other values and social skills.

Nowadays most of the educational currents agree on making the learning process constant, active and significative, making the student the main instigator of their own learning while the teacher is a guide. A more debated point is the use of technology, some opposing firmly to it while others voucher for it. Despite that, even if now the tools are increasing in number and quality, there are still too few amounts, especially since each teacher has its own way of teaching and where some thrive with specific tools others find them lacking.

This proposal aims to make from a game known to children like Minecraft a tool that accomplishes what the actual currents defend, being a game easy to learn with infinite possibilities it seems clear that is, at the very least, an adequate tool if used correctly.

Subjects usually are separated and barely linked bar some contents that overlaps or are tied due to the similarity. Being said so it is not enough to consider every subject a part of a whole instead of small different blocks. Using Minecraft, we can use these blocks to build a world special for the students, original but, overall, complete and whole once again.

With the increasing use of technology, and specially since the COVID-19, social relationships have shifted to a more digitally oriented ones, and even if several talks are being held in the classrooms regarding cybersecurity, most education institutions are missing on the newfound need of a secure digital space for students to interact with one another. Not just a forum to post ideas or their parents lending them the phone to chat to a friend but an actual digital meeting point safe and accessible. Using a server, the school can whitelist the users, making it only accessible for the students and the teachers, making it as safe as the school itself

since no stranger can enter it with their user ID in the whitelist, letting students have a way to contact their peers by themselves, always controlled by the teachers, or at very least with the ability to use the game logs to solve conflicts if necessary.

5.1. Objectives

The objective of the proposal is to provide a motivating and original tool for both teachers and students to develop activities and learning situations, and for it to be focused on learning as a whole instead of separating the subjects, providing relations between each other.

Other objective is to teach how to use digital devices for teaching, combining the ludic and creative aspect of the game with the possibility of learning new contents and developing competences along the way.

5.2. Contents

The contents that will be used are in the official BOCM, however the ones that will be worked on all the activities and in each activity will be stated here it and the ones specific from each activity.

Based on the *Boletín Oficial de la Comunidad de Madrid of 18 of July of (2022, p.33-125)* the contents are:

Promotion of curiosity, initiative, consistency and a sense of responsibility in the conduct of different research. Trial and error in the scientific method. Use of digital resources with responsibility Digital devices and resources. Safe and efficient information search strategies on the internet (valuation, discrimination, selection, organization and intellectual property). Strategies for collecting, storing and representing data to facilitate their understanding and analysis. Basic rules of security, privacy and good use of technology to browse the internet and to protect the personal digital learning environment. Restricted and secure digital resources and platforms for communicating with other people. Digital etiquette, basic rules of courtesy and respect and strategies for solving problems in digital communication. Strategies to promote good use. Recognition of the risks associated with inappropriate and unsafe use of digital technologies (excessive time spent on them, cyberbullying, technological dependency, access to inappropriate content, etc.) and

strategies for action. Phases of design projects: needs identification, design, prototyping, testing, evaluation and communication. Stages of computational thinking (decomposition of a task into simpler parts, pattern recognition and creation of simple algorithms for solving the problem...). Materials, tools, objects, devices and digital resources (block programming, sensors, motors, simulators, 3D printers) safe and suitable for the achievement of the project. Equality between people. Computer applications for recording, audio editing and music score editing. Introduction to interpretative methods. Elements of performance and stage creation. Approach to the scenic genres. Use of non-discriminatory language respectful of differences. Respect for linguistic courtesy strategies. Discursive genres Oral production: elements of prosody (intonation, diction: articulation, rhythm, volume...) and non-verbal communication. Construction, communication and critical assessment of knowledge through planning and production of oral and multimodal texts with autonomy. Adaptation of the use of language to different purposes and different communicative needs. Basic mechanisms of coherence and cohesion, with special attention to pronominal substitutions and the temporal correlation established by the different tenses. Self-confidence. Error as a tool for improvement as part of the learning process. Basic strategies for understanding, planning and production (re-read the text, use your prior knowledge, read between lines, think out loud, summarize, locate keywords, make predictions, visualize, analyze images and photos, identify general information and specific details, inference the meaning of new words and phrases according to context, imitates, repeats...) of oral texts, written and multimodal brief, simple and contextualized in English. Critical thinking. Self-knowledge. Reflection and expression of thoughts. Human nature and personal identity. Equality and difference between people. Freedom and determinism. Emotions and feelings. The self-esteem. Ethics as a guide to our actions. Ability to express opinions by listening and respecting others. Norms, virtues and moral feelings. Independence of decision making. Positive attitude and ability to dialogue in the search for solutions to conflict situations. Basic strategies of teamwork. Simple team work techniques and conflict management strategies. Respect for the rules and care in the use of tools. Fostering curiosity, interest, motivation and initiative in the development and implementation of activities.

Overall, the contents present in most activities are those regarding the relationship of students with technology, being so a healthy and safe one, in which they can use them with total confidence while being aware of the dangers that comes with it; the ability to gather, organize and use information they find; The ability to divide a complex task into more simple actions;

the ability to express themselves and how to make an exposition correctly and how to make correct use of videos and characteristics including actuation and scenario; And the ability to work with others, listening other's ideas and respecting their peers and their ability to solve problems by themselves.

More specific contents are included in each activity.

5.3. Temporalization

This proposal is intended to last a whole year because it connects several contents from all the curriculum, tying knowledge learnt during the whole year, in the annex there is an image containing the days each activity lasts as well as the evaluation period of each activity.

5.4. Methodology

Game based learning: This methodology refers to the use of different games and aspects of these and implement them in the classroom to enhance motivation and the willingness of students to participate in the lessons (*Game-based Learning*, 2015)

Far from using different games to teach different contents, thanks to the adaptability of Minecraft as a game, we can positively use it for teaching a wide variety of content.

Project based learning: According to Quint et al., (2017), in their literature review they explain that although it is widely spread among the education community, there is a lack of consensus on what should and shouldn't be in a PBL classroom. They also explain how several criteria shape the implementation in the classrooms being the most important teacher beliefs, practice and school context.

In this proposal, students work in group to solve problems and situations based and the curriculum and interdisciplinary. The project is connected to something real, promoting significative learning or learning based on the real-life environment.

In this project students will be working in groups in order to create and present their activities, making them based on their close context.

Gamification: According to Stott and Neustaedter (2013) Gamification is the implementation of game and videogame dynamics, mechanics and frameworks to non-game settings.

To make the lessons immersive, the most common example is a score or punctuation system but it involves more than just punctuation, this can be also some elements like the use of music since in games they use it as both a narrative element to express feelings and to create a mindset when doing a task in game.

The difference of this and game-based learning is that game-based learning is more focused on creating games or using some of their mechanics to help with motivation while gamification instead of making it like a game instead uses some elements without transforming the lesson into a game.

In this proposal game elements from Minecraft to develop the lessons will be used.

Multiple intelligence theory: despite this not being a methodology itself, it is deeply related so it is necessary to mention it.

According to Almeida et al., (2010 p.226)

Gardner considers the assessment of intelligence as a procedure which should be understood as a part of the teaching and learning process. Cognitive competency is assessed in a natural way at the appropriate moment. Thus abilities are assessed in the classroom as students learn the curriculum. Thus, the materials used in the assessment are intrinsically interesting, in contrast with traditional intelligence tests which usually include abstract items that few children are enthusiastic about. According to Gardner, cognitive assessment should happen in enthusiastic contexts where children solve problems and accomplish projects to obtain the best performance.

This theory developed by Howard Gardner explains how there are several types of intelligence, and by extension, multiple ways for students to learn, for instance a student with logical-mathematical intelligence will need a different way of being taught than a student with a musical, where one will have learning strategies like creating mnemotechnic rules related to numbers as the other may for example associate some contents to some rhythms or tunes. He also explains how not only the teaching must be focusing on a few intelligences but also the evaluation tools used have to be engaging and motivating to the students.

Schools normally greatly focuses on logical-mathematical and linguistic intelligences, leaving aside the rest. However, using Minecraft as proposed, the rest are developed:

Interpersonal: With the creation of common servers where they can cooperate, we create opportunities of creating social relationships in a controlled environment

Intrapersonal: Even if they share the same world, there will be moments where they will be doing things by themselves, being able to see their shortcomings as well as their strengths.

Naturalistic: They will be able to work on ways to protect the biodiversity of their world, creating natural reservoirs and ways to exploit the resources without overdoing it

Visual-spatial: Being a game which one of the core mechanics is building, they will be able to create buildings and express themselves through it, they will work on how to making them visually appealing as well as functional.

Musical: Minecraft have music blocks where they can create tunes and music, with options to make different instruments and arrangements.

5.5. Resources.

The materials needed for all the activities are 26 computers, 26 Minecraft accounts and a projector to show the builds and the videos.

The human resources are a teacher and an auxiliar I.T. to solve any issues that may occur with the PCs or the accounts.

The only special resource needed is a computer's room to freely play.

5.6. Usage of creative and survival.

Before entering the activities, the letters next to the names of the activities refers to the world they must be accomplished in.

The S world refers to the survival world, where resources are not infinite and they have to eat and fend off hostile creatures. The aim of these is the cooperation among peers to accomplish a common task. Activities in this world tend to be more fulfilling because they have start from scratch with no help other than their classmates. They will have their own houses and creating their own makeshift towns if needed.

The C world or creative world on the other hand is for mor artistically or creativity-oriented activities where they have to make bigger buildings and usually involve bigger projects

or ones that focuses more on their original content and ideas and the result rather than the process

5.7. Development of the activities.

As mentioned earlier there will be two worlds, one in creative and one in survival, the creative world will be for bigger building tasks while the survival will be for creating a community as well as longer or more based on cooperation activities.

5.7.1. Activity 1: Origin of civilizations (S).

5.7.1.1. *Objectives.*

The objective will be to create a village based on one of the main ancient civilizations, being so Mesopotamian, Ancient Egypt, Ancient China and ancient Greek, being distributed randomly among 4 groups of 6.

5.7.1.2. *Content*

Ancient civilization's culture and architecture, artistic expressions and religion. Expansion and evolution through time and legacy through time.

5.7.1.3. *Development*

The teacher will create the groups and give each group the civilization they will be doing. Once done the teacher will give them the session to put in common their ideas and investigate. In the survival world, students will have a week to gather resources and build their civilization in a location of their choice. After a week they will have a session to discuss what will they be exposing and who will explain what part. They will have to explain both the civilization and why and how did they extrapolate it to Minecraft and finally every student will be exploring every civilization, with their creators acting as touristic guides.

5.7.1.4. *Temporalization*

They will 5 sessions plus one for assessment of 50 minutes

5.7.2. Activity 2: Natural process(C)

5.7.2.1. Objectives

The students will be creating a model based on the life cycle of plants, mammals, birds and insects in 4 groups of 6.

5.7.2.2. Content

Different phases that each species passes through.

how a seed germinates and transform into a seedling, how is it able to grow and finally how do they spread more seeds. phases of a fetus until its born and how the child develops. how and why do birds lay eggs and the development phases and for insects what is a larva and why do they use a cocoon to develop.

5.7.2.3. Development

The teacher will be giving each group their species and after explaining what a life cycle is they will be investigating how each species does so and in the creative world they will have to create a model explaining each part.

5.7.2.4. Temporalization

They will 5 sessions plus one for assessment of 50 minutes

5.7.3. Activity 3 Middle Ages (S)

5.7.3.1. Objectives

The objective will be to create a full-fledged middle age civilization based on the Iberian Peninsula, including some of the most important aspects of them, such as vertical mills, crop rotation, their characteristic architecture. This activity will be made by the whole class as a group.

5.7.3.2. Content

The artistic and cultural expressions of the medieval, modern and contemporary period and their historical contextualization. The role of art and culture in the medieval, modern and contemporary world. The Spain of the three cultures: Judaism, Christianity and Islam.

5.7.3.3. *Development*

The teacher will explain some of the advancements made in Middle Ages as well as the most important characteristics regarding agriculture, architecture and culture. Then the teacher will let them a week to build a city based on this, the teacher should give the guidelines on what parts have to be present and if needed make small groups to build each part as well as a role of planner to guide where to build each thing.

5.7.3.4. *Temporalization*

They will 5 sessions plus one for assessment of 50 minutes

5.7.4. Activity 4: Through ages (C)

5.7.4.1. *Objectives*

Students will have to make a small video in teams based on a historical period to show to the classroom. They shall include society, culture and some characteristic aspects of it.

5.7.4.2. *Content*

The timeline: the ages of Spanish history. historical sources: classification and use of the various sources (oral, written, heritage). Relevant themes in history (Middle Ages, Modern Age and Contemporary Age), the role played by historical subjects (individual and collective), events and processes.

5.7.4.3. *Development*

After giving away each historical age to each group of 6, they will have a week to make a video acted by them in-game talking and explaining the most important parts of it.

The teacher will show the students how to record their screens while playing the game, helping them the first days in case they have doubts. The main aspects that must be in the video are the society, the architecture and the most important advancements as well as the event that promote the change to a new age.

5.7.4.4. *Temporalization*

They will 5 sessions plus one for assessment of 50 minutes

5.7.5. Activity 5 Climate diversity (S)

5.7.5.1. Objectives

Through exploration and building they will have to recreate the main climatic zones that exists in earth, being so tropical, subtropical, mild and cold, they will have to recreate their characteristics such as their geological formations, their materials and how humans use them and its location in earth.

5.7.5.2. Content

Basic classification of rocks and minerals, uses and exploitation of geological resources; basic geological topographical formation; modification processes and relief forms and features and climate and the earth, introduction to the big climatic areas of the world and its landscapes.

5.7.5.3. Development

Students will be given each one of the Minecraft main biomes, being them snowy, cold mountain, forest, desert, jungle, ocean and badlands/mesa. Students that end up with the same biome have to team up to first find the biome, note which biomes surround it and later they will have to investigate how is the biome in real life, different geological formations to recreate them later in-game, finally they will have to prepare an exposition explaining everything they learnt.

5.7.5.4. Temporalization

They will 5 sessions plus one for assessment of 50 minutes

5.7.6. Activity 6 Climate utopia (C)

5.7.6.1. Objectives

Students will have to create a city as eco-friendly as possible, taking into account distribution of buildings, obtention of energy, transport and public spaces

5.7.6.2. *Content*

Urban Agenda. Urban development and the care of natural resources. The city as a space for coexistence. 7The local-to-global climate change: causes and consequences. Mitigation and adaptation measures. Social and environmental responsibility. Relationship between living beings and ecosystems, and between people, societies and the natural environment. Appropriate lifestyles: the limits of the planet and the depletion of resources. The ecological footprint.

5.7.6.3. *Development*

The teacher will start the session asking students what pollution is and what do they know, after reviewing what it is and main causes, they will be given the task to create a city in groups of six that mitigates all those problems, they will be given a week to later explain the main aspects that are present in their cities. All cities must have a way to generate energy, a way of transport not by foot (bike roads or similar) and public places.

5.7.6.4. *Temporalization*

They will 5 sessions plus one for assessment of 50 minutes

5.7.7. Activity 7 Virtually installed (S)

5.7.7.1. *Objectives*

Students will have to create each an artistic installation, trying to evoke something to the visitor. Being so a sensation, a feeling or a story of some sort.

5.7.7.2. *Content*

Analysis of artistic creations, development of self-expression and use of resignification and artistic installations.

5.7.7.3. *Development*

Students will be given each a week to develop an artistic installation, to do so the teacher will first show some real artistic installations, explaining how are they using objects and resignification and what do they express, so they can later create their own in Minecraft.

5.7.7.4. *Temporalization*

They will 5 sessions plus one for assessment of 50 minutes

5.7.8. Activity 8 Musical arrangement (C)

5.7.8.1. *Objectives*

Students will have to create a musical arrangement using note blocks based on real-life melodies and songs, they will have to use different sounds available as well as timers to adjust the timing.

5.7.8.2. *Content*

Sound and its qualities (pitch, duration, timbre and intensity): visual and auditory identification, classification and representation of the diversity of sounds and rhythmic-melodic structures through different spellings. Voice and musical instruments. Families (wind, string, percussion and groups (choirs, bands, orchestras). Classification. Visual and auditory identification. Digital and non-conventional instruments. Co-opters. The character, tempo, tempo, musical genres, texture, harmony and form after listening to musical works. Instrumental, vocal and corporal practice: experimentation, creative exploration, interpretation, improvisation of vocal and instrumental pieces from different eras. Musical languages: knowledge and application of their fundamental concepts in the interpretation and improvisation of vocal and instrumental musical proposals containing compositional procedures: repetition, imitation, variation and development. Silence in music as a fundamental element.

5.7.8.3. *Development*

The teacher will put some musical arrangements made with noteblocks so they know what are they asked for. Once done they will have to look up a sheet music, and after the teacher gives the permission, they will have to build it in-game; to do so they will be using Redstone and repeaters to create the tempo and several blocks that placed under the noteblock sound as several different instruments.

5.7.8.4. *Temporalization*

They will 5 sessions plus one for assessment of 50 minutes

5.7.9. Activity 9 Olympic trial (C)

5.7.9.1. Objectives

Students will have to create an Olympic stadium with several sports from the Paris Olympics in 2024, they will include a pool for water sports, a running field, a throwing field and acrobatics

5.7.9.2. Content

Olympic and Paralympic sports, history and institutions associated with the Olympic and Paralympic Games. Categories, sports, functional diversity and their ability to develop any sport discipline.

5.7.9.3. Development

After reviewing some of the main Olympic games and some of the competitions in class, students will have to build the stadium with their respective fields and buildings where the games are set in groups based on the different fields, being so throwing, athletics, swimming and acrobatics. They will have to investigate about official measurements and implement them in the recreation as close to reality as possible, after a week they will be told to explain the measurements of the building and rules of the competitions.

5.7.9.4. Temporalization

They will 5 sessions plus one for assessment of 50 minutes

5.7.10. Activity 10 Story mode (C)

5.7.10.1. Objectives

Students will have to develop an adventure map, telling a story in an immersive mode containing introduction, knot and resolution. They will have to use basic commands and to create the scenery according to what they want to transmit

5.7.10.2. *Content*

Creation of literary texts (tales, poems, songs, small plays) freely and from the recreation and appropriation of models given using lexical, syntactical, phonic and rhythmic resources in these productions. Parts of a narrative story and pacing.

5.7.10.3. *Development*

Students will be given a week to create a story in groups of three, although they can base off already existing stories, they have to give a spin to their story so it becomes an original creation. After doing so the adventure maps shall be played by their peers.

5.7.10.4. *Temporalization*

They will 5 sessions plus one for assessment of 50 minutes

5.7.11. Activity 11 Greedy villagers (S)

5.7.11.1. *Objectives*

Students will have to find a village and start trading with the villagers, investigate what currency do they use and the change in prizes that they notice. Villagers increase the price if the same repeated trade is done over and over or if the player antagonize them by hitting them and will lower the price if the player help the villager raise their mastery in their job or if they are saved from pillagers, making it a constant change in prices

5.7.11.2. *Content*

solving of problems related to consumption (value/price, quality/price and best price) and money: prices, interest and discounts.

5.7.11.3. *Development*

The teacher will task the students to find and defend a village in groups of three, telling them to have at least one villager for each job that there is in the game, excluding the wandering trader, being so armorer, butcher, cartographer, cleric, farmer, fisherman, Fletcher, leatherworker, librarian, stone mason, shepherd, tool smith and weaponsmith. In case there are not enough villager the teacher will spawn more until there are enough. After the week they will put in common their findings with the rest of the class.

5.7.11.4. *Temporalization*

They will 4 sessions plus one for assessment of 50 minutes

5.7.12. Activity 12 All roads lead to Rome. (S)

5.7.12.1. *Objectives*

Students will have to make roads connecting their homes, each house have to have at least two roads and they will have to measure the road with one block being one meter, they will also have to create a road towards the spawn point. They will also have to note the coordinates of their peers' houses.

5.7.12.2. *Content*

Conventional units of the Decimal Metric System (length, mass, capacity, volume and area), time and degree (angles) in everyday life contexts: selection and use of appropriate units expressed in a simple or complex way, of the same magnitude, applying the equivalences between units (decimal system) to problems of everyday life. Location and displacement in plans and maps from reference points (including cardinal points), directions and distance calculation representation (scales): description and interpretation with the appropriate vocabulary on physical and virtual media. Description of positions and movements in the first quadrant of the Cartesian coordinate system. Movements and transformations

5.7.12.3. *Development*

Students will have to use building blocks of their choosing to create a road that connects their houses with their peers and to the spawn point being in coordinates $0, \sim, 0$; and they will have to count how many meters separate them and the origin coordinates. After all roads are done, they will have to follow the roads and note the coordinates. Finally, they will have to put all them in common to see if they have the same results.

5.7.12.4. *Temporalization*

They will 5 sessions plus one for assessment of 50 minutes

5.7.13. Activity 13 Pixel perfect (C)

5.7.13.1. Objectives

Students will have to create a mosaic using at least three kinds of block in a 32 x 32 area. They will have to take into account the type of block they will be using and implementation of geometrical figures

5.7.13.2. Content

Ideas and geometric relationships in art, science and everyday life. Creating recurring patterns from regularities or other patterns using numbers, figures or images.

5.7.13.3. Development

The teacher will show some geometrical mosaics, making emphasis in the use of colors and the use of some geometrical figures to make some new, using a pattern to fill a whole floor. Then they will have to do the same to create a pattern in an area.

5.7.13.4. Temporalization

They will 2 sessions plus one for assessment of 50 minutes

5.7.14. Activity 14 Voxel geometry (S)

5.7.14.1. Objectives

Students will have to decompose a real-life world monument into blocks and recreate it in groups in Minecraft, it will be done next to the roads or near the origin coordinates and the monuments will be the Egypt pyramids and sphynx, the roman coliseum, Leon's cathedral and Barcelona's triumph arch.

5.7.14.2. Content

Geometric figures in everyday objects: identification and classification based on their elements (faces, angles, edges, vertices in three-dimensional) and the relationships between them. Techniques for constructing geometric figures by composition and decomposition, using manipulable materials, drawing instruments (ruler, paperboard, compass, angle conveyor...) and

computer applications. Geometric vocabulary: verbal description of the elements and properties of geometric figures.

5.7.14.3. Development

The teacher will show them some monuments and how are they formed of several geometrical figures, leaving the ones that shall be done by students for the end to be done by students, first they will have to outline the figures they see on paper, and after the teacher sees they understood, they will have to recreate them in-game, This doesn't need to be the same size as the originals, but they need to be identifiable, and most importantly, the geometric figures seen previously have to be identifiable too.

5.7.14.4. Temporalization

They will 4 sessions plus one for assessment of 50 minutes

5.7.15. Activity 15 Natural reservoir (S)

5.7.15.1. Objectives

Students will have to create a natural reservoir in the biomes they had previously found and worked on during activity 5: Climate diversity and create a natural reservoir, including animals and plants investigating real-life ones to see what they have to include and what to avoid while building it.

5.7.15.2. Content

The limits of the planet and climate change. The duty and legal obligation to protect and care for the planet.

5.7.15.3. Development

The teacher will first ask them if they know what a natural reservoir is, and after putting all the knowledge in common they will be tasked with creating a natural reservoir. To do so they will split into the groups that they were during activity 5, and in the lapse of a week they will have to create the reserve and explain the characteristics involving its ecosystem and what they did to protect them.

5.7.15.4. Temporalization

They will 5 sessions plus one for assessment of 50 minutes

5.7.16. Activity 16 Castle programming (C)

5.7.16.1. Objectives

Students will have to create a chain of commands to create a castle. To do so they will have to use the command /Setblock along with loops and conditionals.

5.7.16.2. Content

Initiation to programming through analogue resources (unplugged activities) and digital resources (block-based digital programming platforms) adapted to the student's reading level. Interpretation and execution of simple algorithms (routines, instructions with ordered steps, rules of games, instructions, sequences, repetitive patterns, block programming). Programming basics: loops, conditionals, operators, messages, variables, functions, events, debugging (debugging).

5.7.16.3. Development

The teacher will first explain how to input commands in Minecraft using "/" and the prompt for using later in the task of creating a castle using only commands to build it. To do so they shall use the command /setblock. To speed up the work they will be introduced to loops, letting them build bigger structures in the same amount of time.

5.7.16.4. Temporalization

This activity will take 2 sessions with option to amply to 3 sessions of 50 minutes

5.8. Evaluation and assessment.

The main evaluation method that we will be using are rubrics that we will hand the students so they know what are the things the teacher requires in their work. Our most valuable tool is observation, since interaction between peers is very important, teachers must look out for the behavior of the students as well as how they work alone and with others, where do they begging regarding the game and their skills with it. The evaluation rubrics are in the annex.

Observation is extremely important since Rubrics do not cover situations that may occur during lessons, from a student missing to the initial point and evolution of students are to be taken into account, not only to give a punctuation to the student but to also give them feedback so they can further improve

5.9. Teacher's job

Teachers have a very important role in this proposal as they have to look out on how social relationships are developing, not just in the classroom but also in the game, making sure none are getting isolated and stablishing some base rules for convivence like “not stealing or not breaking other's blocks and items” simple as that may be students may feel that they would manage to do so and teachers must avoid it. Second teachers must make sure that students don't settle too far away one from another. Third they have to provide in case an activity needs something but the students don't find it such as a biome or a specific mob. Finally, teacher must be aware of how they split the work and the roles they may have, it is okay if one is the gatherer, other the main builder and one is the perfectionist, aiding both and giving the final touches, however none should stay idle and have them always on the move. This is especially important in the first activities as this system of work inside the game is novelty and they may be confused on how to proceed or how to split tasks.

6. Conclusions.

This work aimed to prove the use of videogames in classrooms can be as beneficial as some of the most common used tools regarding teaching, and even with focusing in just one game it has proven that despite the prejudices and drawbacks that may hindrance the application of games, its versatility, freedom and a teacher to guide and control the learning environment can lead to learning the contents while potentiating the social skills and creativity, while using several kinds of activities to engage in the multiple ways of learning and diversity children may have.

Creating a server with both a creative and survival world they can access it both in school and at home, making the learning process continuous. They can also proudly show their creations to their parents, boosting the sense of satisfaction with a work well done.

Globalization brought changes both good and bad, however, schools are changing way more slowly than society. And even if there are new currents that regard students as the center

of the learning, sometimes it is forgotten that the teacher has to still guide them, not only in curricular content but also in social and moral aspects. Other aspect is because of the rapid currents, usually methodologies doesn't come with a manual step-by-step on how to be the best teacher of the world, leaving the teacher lost in a sea of good ideas without a foolproof way to implement them.

This work is not the foolproof way only spoken in legends; however, it provides an option for teachers to later adapt and modify to their own methods. After all it is commonly spoken of "Student diversity" but it is rare to hear about "Teacher diversity" where each teacher has its own strengths and weaknesses and have to learn to boosts the first and mitigate the second.

This proposal takes most of the aspects regarding the actual paradigm in the educational context and brings up to the table a new tool that is not only motivating and engaging with infinite possibilities to put in practice. But also links every subject in the school so students can not only see the application of what they are learning, but also see the relation between subjects more clearly, something usually neglected by the teacher community.

Overall, this project manages to link students with learning in both school and at home using digital tools, creating significative learning through active methodologies while taking into account the individuality of students, creating an environment ideal for learning and socializing, the two most important aspects during their development and it also gives an example based on actual methodologies on how technologies and more importantly, games can be used for teaching.

Finally, one of the biggest limitations with this project is that it was not possible to implement it in the classroom, it is just a theory so some tweaks may be needed depending on the teacher and school if it is finally implemented.

7. Future lines of research.

In case someone uses this as a base for future research, it is important to take into account that the world of videogames is very rapidly changing so something may need revision. However, in case it is used here are some recommendations for the future.

Focusing on one subject may lose purpose on the cross curricular aspect of the proposal, however it would let for a way deeper insight of the versatility of the tool.

Using another sandbox game as the main tool, for example the popular game Roblox, can create interesting results as that is more focused on the creation of games rather than using the same to its limits.

Using mods can provide of even more easy ways to teach a content, for example the mod Create uses cogs and rotation to create energy and move machinery and contraptions, this would teach them cog rotation as well as conversion of wind and water into energy. Other example is the mod “Mekanism”, which allows the creation of energy using solar panels, windmills and even nuclear energy and the usage of machinery to decompose materials into more basic ones. With a very active community of modders possibilities becomes even more endless and therefore even more opportunities arise for teaching students’ new things.

This work was made with vanilla Minecraft Windows edition in mind, Bedrock edition as well as education edition works differently, with the last being geared towards schools.

8. Greetings

Finally, on a personal note I want to give my personal thanks to the teacher I had all along the way; Every one of them gave me an example of what and what not to do, being good or bad to whatever criteria anyone judge them, they all contributed on me being here and forming me both in contents and as a person.

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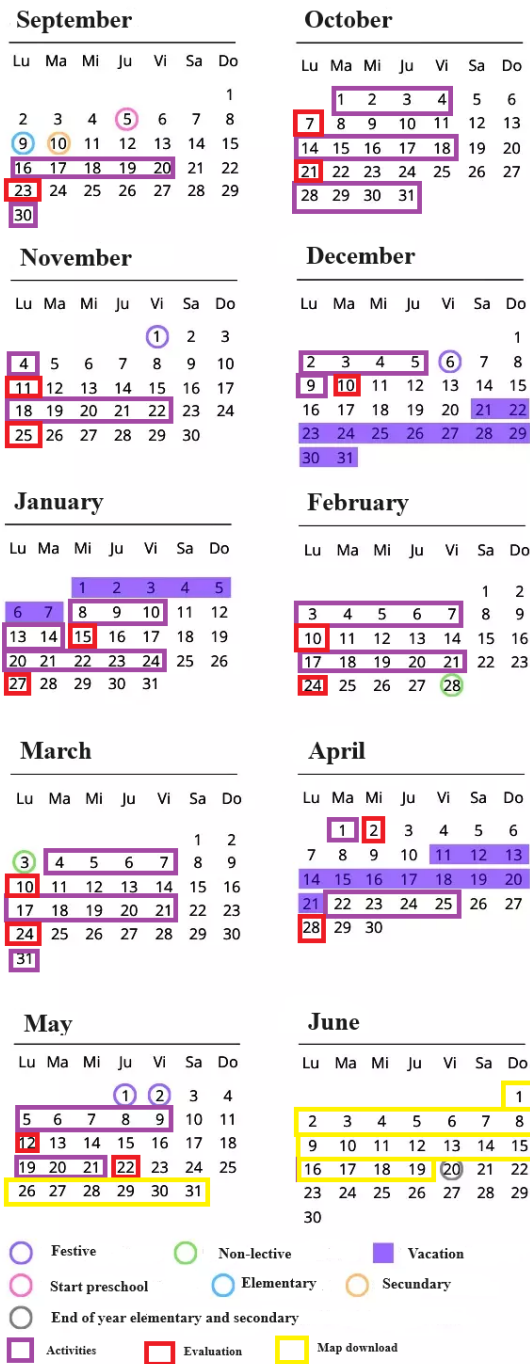
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10. Anex

Img.1 Calendar



Rubrics:

Activity 1: Origin of civilizations

Criteria	4 - Advanced	3 - Proficient	2 - Developing	1 - Beginning
Understanding of Civilization	Demonstrates a deep and accurate understanding of the assigned civilization, including its culture, architecture, artistic expressions, and religion. Accurately reflects these elements in the Minecraft village.	Shows a good understanding of the assigned civilization, with most cultural, architectural, and religious elements accurately reflected in the Minecraft village.	Shows a basic understanding of the assigned civilization, but some elements are inaccurately or incompletely reflected in the Minecraft village.	Shows little understanding of the assigned civilization; many elements are missing, inaccurate, or not reflected in the Minecraft village.
Research and Investigation	Conducts thorough research, incorporating a wide range of sources to inform the project. Information is well-organized and clearly supports the construction	Conducts adequate research, using several sources to inform the project. Information is generally organized and supports the construction and explanation of the	Conducts minimal research, relying on a limited number of sources. Information is somewhat disorganized and provides limited support for the	Conducts little to no research. Information is poorly organized or missing, with little connection to the Minecraft village.

	and explanation of the Minecraft village.	Minecraft village.	Minecraft village.	
Creativity and Extrapolation	Demonstrates exceptional creativity in translating the civilization's culture, architecture, and other elements into the Minecraft world. The final product shows original thinking and a unique approach.	Demonstrates creativity in translating the civilization's elements into Minecraft. The final product is thoughtful and shows some originality.	Shows some creativity in the Minecraft village, but the translation of the civilization's elements may lack originality or depth.	Shows little creativity or originality in translating the civilization's elements into Minecraft. The final product is simplistic or derivative.
Collaboration and Teamwork	Works exceptionally well with group members, contributing ideas, respecting others' opinions, and helping to build a cohesive project. Actively	Works well with group members, contributing to discussions and tasks. Shows respect for others' ideas and participates in most group activities.	Works with group members but may struggle with communication or participation. Contributions may be uneven or inconsistent.	Struggles to work with group members, showing little participation or contribution. May hinder the group's progress or create conflicts.

	participates in all group discussions and tasks.			
Presentation and Explanation	Provides a clear, detailed, and engaging presentation of the civilization and how it was represented in Minecraft. All group members are well-prepared, articulate, and share responsibility in the presentation.	Provides a clear and accurate presentation of the civilization and its Minecraft representation. Most group members are well-prepared and articulate, with responsibilities shared among the group.	Provides a basic presentation, but some details may be unclear or underdeveloped. Not all group members are well-prepared or evenly involved in the presentation.	Presentation is unclear, lacks detail, or is poorly organized. Some group members may not participate, and responsibilities are not evenly shared.
Tour Guide Role	Acts as an engaging and knowledgeable tour guide, providing in-depth explanations and answering questions confidently. The tour is well-organized and	Acts as a knowledgeable tour guide, providing clear explanations and answering most questions. The tour is organized and informative.	Acts as a basic tour guide, providing some explanations but may struggle with organization or answering questions. The tour provides limited information.	Struggles to act as a tour guide, providing minimal explanations and unable to answer questions effectively. The tour is disorganized and lacks

	informative, enhancing the understanding of the civilization.			informative content.
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Activity 3: Middle Ages

Criteria	4 - Advanced	3 - Proficient	2 - Developing	1 - Beginning
Understanding of Historical Context	Demonstrates a deep and accurate understanding of the Middle Ages in the Iberian Peninsula, including key advancements in agriculture, architecture, and culture. Accurately reflects these elements in the Minecraft civilization.	Shows a good understanding of the historical context, with most key elements accurately represented in the Minecraft civilization.	Shows a basic understanding of the historical context, but some elements are inaccurately or incompletely reflected in the Minecraft civilization.	Shows little understanding of the historical context; many elements are missing, inaccurate, or not reflected in the Minecraft civilization.
Incorporation of Artistic and Cultural Elements	Integrates artistic and cultural expressions	Incorporates artistic and cultural elements from	Shows some effort in incorporating artistic and	Struggles to incorporate artistic and cultural

	from Judaism, Christianity, and Islam into the project seamlessly. The model accurately reflects the diverse cultural influences of the time.	the three cultures with some accuracy. The project reflects the cultural diversity of the Middle Ages.	cultural elements, but the representation may lack depth or accuracy. The cultural diversity is somewhat reflected.	elements, with many inaccuracies or missing aspects. The project fails to reflect the cultural diversity of the period.
Creativity and Architecture Design	Demonstrates exceptional creativity in designing the city. The architecture is detailed, historically accurate, and visually appealing, reflecting the key characteristics of the time.	Demonstrates creativity in designing the city. The architecture is well-made and generally accurate, reflecting most key characteristics of the time.	Shows some creativity in city design, but the architecture may lack detail or accuracy in reflecting the time period.	Shows little creativity in city design. The architecture is simplistic, historically inaccurate, or fails to reflect the key characteristics of the time.
Collaboration and Teamwork	Works exceptionally well with classmates, contributing ideas, respecting	Works well with classmates, contributing to discussions and tasks. Shows respect for	Works with classmates but may struggle with communication or participation. Contributions	Struggles to work with classmates, showing little participation or contribution. May hinder the

	<p>others' opinions, and helping to build a cohesive project. Actively participates in all group discussions and tasks.</p>	<p>others' ideas and participates in most group activities.</p>	<p>may be uneven or inconsistent.</p>	<p>group's progress or create conflicts.</p>
<p>Role Fulfillment (Planner/Builder)</p>	<p>Fulfills assigned roles (e.g., planner, builder) with excellence. The planner provides clear guidance on the city's layout, and builders execute the plan effectively, resulting in a well-organized and coherent city.</p>	<p>Fulfills assigned roles effectively. The planner provides good guidance, and builders follow the plan, resulting in a well-constructed city with minor issues.</p>	<p>Fulfills assigned roles with some challenges. The planner may struggle to provide clear guidance, or builders may have difficulty following the plan, leading to a less coherent city.</p>	<p>Fails to fulfill assigned roles effectively. The planner provides little to no guidance, and builders do not follow the plan, resulting in a disorganized or incomplete city.</p>
<p>Accuracy and Detail of the Final Product</p>	<p>The final product is highly accurate, detailed, and aligns well with the historical</p>	<p>The final product is accurate and detailed, with most required aspects present</p>	<p>The final product shows some accuracy and detail, but may be missing some required</p>	<p>The final product is inaccurate or incomplete, with significant errors or</p>

	context. Every required aspect is present and carefully crafted.	and well-crafted.	aspects or lack precision.	missing elements. The project does not effectively represent the historical period.
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Activity 4: Through ages

Criteria	4 - Advanced	3 - Proficient	2 - Developing	1 - Beginning
Understanding of Historical Period	Demonstrates a deep and accurate understanding of the assigned historical period, including key societal, cultural, and architectural aspects, as well as significant events and advancements.	Shows a good understanding of the historical period, with most key aspects accurately represented in the video.	Shows a basic understanding of the historical period, but some aspects are inaccurately or incompletely represented in the video.	Shows little understanding of the historical period; many aspects are missing, inaccurate, or not effectively represented in the video.
Content Accuracy and Depth	The video content is highly accurate	The video content is accurate and	The video content has some	The video content is inaccurate or

	and comprehensive, covering all required elements (society, architecture, advancements, and key events) with depth and detail.	covers most of the required elements with sufficient detail.	inaccuracies or lacks depth, with some required elements either missing or not fully developed.	incomplete, with many required elements missing or poorly developed.
Creativity and Presentation	Demonstrates exceptional creativity in the video presentation. The video is engaging, well-structured, and makes effective use of Minecraft to illustrate historical elements.	Demonstrates creativity in the video presentation. The video is well-structured and uses Minecraft effectively to represent historical elements.	Shows some creativity in the video, but the presentation may lack engagement, structure, or effective use of Minecraft.	Shows little creativity in the video presentation. The video is poorly structured, unengaging, or fails to effectively use Minecraft to illustrate historical elements.
Use of Historical Sources	Uses a variety of historical sources effectively to inform the video content. Sources are accurately	Uses several historical sources to inform the video content, with accurate interpretation and integration	Uses limited historical sources, with some interpretation or integration issues. The video may rely	Uses few or no historical sources, with poor interpretation or integration. The video lacks credible

	interpreted and integrated into the presentation.	into the presentation.	too heavily on one type of source.	historical context.
Collaboration and Teamwork	Works exceptionally well with team members, contributing ideas, respecting others' opinions, and helping to create a cohesive video. Actively participates in all group discussions and tasks.	Works well with team members, contributing to discussions and tasks. Shows respect for others' ideas and participates in most group activities.	Works with team members but may struggle with communication or participation. Contributions may be uneven or inconsistent.	Struggles to work with team members, showing little participation or contribution. May hinder the group's progress or create conflicts.
Technical Skills and Video Quality	The video is of high quality, with clear audio and visuals. Demonstrates strong technical skills in recording, editing, and using Minecraft to create a professional	The video is of good quality, with clear audio and visuals. Demonstrates solid technical skills in recording, editing, and using Minecraft, resulting in a	The video quality is acceptable but may have issues with audio, visuals, or editing. Demonstrates basic technical skills, but the final product	The video is of poor quality, with significant issues in audio, visuals, or editing. Demonstrates limited technical skills, resulting in a rough or

	and polished final product.	well-produced video.	may lack polish.	unfinished final product.
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Activity 5: Climate diversity

Criteria	4 - Advanced	3 - Proficient	2 - Developing	1 - Beginning
Understanding of Climatic Zones	Demonstrates a deep and accurate understanding of the assigned climatic zone, including its characteristics, geological formations, materials, and human interactions. All aspects are accurately recreated in Minecraft.	Shows a good understanding of the climatic zone, with most characteristics, geological formations, and human interactions accurately represented in Minecraft.	Shows a basic understanding of the climatic zone, but some aspects are inaccurately or incompletely represented in Minecraft.	Shows little understanding of the climatic zone; many aspects are missing, inaccurate, or not effectively represented in Minecraft.
Geological Formations Accuracy	Accurately recreates a variety of geological formations relevant to the assigned biome, demonstrating a	Recreates the main geological formations of the biome with accuracy, showing a good understanding of topography,	Recreates some geological formations, but may have inaccuracies or lack detail. Shows a basic understanding of topography,	Recreates few or no geological formations, with significant inaccuracies. Shows little understanding of topography,

	strong understanding of topography, rock types, and mineral uses.	rock types, and mineral uses.	rock types, and mineral uses.	rock types, and mineral uses.
Biome Representation in Minecraft	The Minecraft biome is meticulously recreated with attention to detail, accurately reflecting the real-life characteristics, surroundings, and climate of the zone.	The Minecraft biome is well recreated, reflecting most of the real-life characteristics, surroundings, and climate of the zone.	The Minecraft biome is recreated with some accuracy, but may lack detail or miss some important characteristics of the real-life zone.	The Minecraft biome is poorly recreated, with significant inaccuracies or missing elements. The representation fails to reflect the real-life zone.
Research and Information Gathering	Conducts thorough research on the biome, climate, and geological formations, using multiple reliable sources. The information is well-organized and clearly informs the Minecraft	Conducts good research, using reliable sources. The information is organized and generally informs the Minecraft recreation and the exposition.	Conducts basic research, but may rely on limited sources or have gaps in information. The Minecraft recreation and exposition may be lacking in detail or accuracy.	Conducts little to no research, resulting in significant gaps or inaccuracies in information. The Minecraft recreation and exposition are poorly informed.

	recreation and the exposition.			
Collaboration and Teamwork	Works exceptionally well with team members, contributing ideas, respecting others' opinions, and helping to build a cohesive and accurate project. Actively participates in all group discussions and tasks.	Works well with team members, contributing to discussions and tasks. Shows respect for others' ideas and participates in most group activities.	Works with team members but may struggle with communication or participation. Contributions may be uneven or inconsistent.	Struggles to work with team members, showing little participation or contribution. May hinder the group's progress or create conflicts.
Presentation and Exposition	Delivers a clear, detailed, and engaging exposition of the climatic zone and geological formations. The presentation is well-organized, informative, and effectively uses visual aids	Delivers a clear and accurate exposition. The presentation is well-organized and informative, with effective use of visual aids or in-game examples.	Delivers a basic exposition, but some details may be unclear or underdeveloped. The presentation may lack organization or effective use of visual aids.	The exposition is unclear, lacks detail, or is poorly organized. The presentation fails to effectively use visual aids or in-game examples.

	or in-game examples.			
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Activity 6: Climate Utopia

Criteria	4 - Advanced	3 - Proficient	2 - Developing	1 - Beginning
Understanding of Eco-Friendly Concepts	Demonstrates a deep understanding of eco-friendly concepts, including energy generation, transportation, and urban planning. All aspects are integrated into the city design in a thoughtful and innovative way.	Shows a good understanding of eco-friendly concepts, with most aspects effectively integrated into the city design. The city demonstrates solid planning and environmental awareness.	Shows a basic understanding of eco-friendly concepts, but some aspects are not fully developed or effectively integrated into the city design.	Shows little understanding of eco-friendly concepts, with many aspects missing or poorly integrated into the city design.
Energy Generation Solutions	The city includes innovative, sustainable energy solutions that are well-integrated and demonstrate a	The city includes sustainable energy solutions that are appropriate and mostly well-integrated, demonstrating a	The city includes basic energy solutions, but they may lack innovation or full integration into the overall design.	The city lacks sustainable energy solutions, or the solutions included are poorly chosen or integrated.

	thorough understanding of renewable energy sources.	good understanding of renewable energy sources.		
Transportation and Public Spaces	The city features a highly effective and sustainable transportation system, alongside well-designed public spaces that promote community and environmental well-being.	The city features a good transportation system and well-designed public spaces that contribute to community and environmental health.	The city includes basic transportation and public spaces, but they may not be fully developed or effectively contribute to sustainability.	The city lacks a coherent transportation system or public spaces, or these features are poorly designed and do not contribute to sustainability.
Urban Planning and Building Distribution	The city layout is exceptionally well-planned, with thoughtful building distribution that maximizes efficiency, minimizes environmental impact, and promotes sustainable living.	The city layout is well-planned, with effective building distribution that supports sustainability and minimizes environmental impact.	The city layout shows some planning, but building distribution may be inefficient or not fully support sustainable living.	The city layout is poorly planned, with building distribution that is inefficient or harmful to sustainability.

<p>Creativity and Innovation</p>	<p>Demonstrates exceptional creativity and innovation in city design, incorporating unique and effective solutions to environmental challenges. The city is visually appealing and functionally advanced.</p>	<p>Demonstrates good creativity and innovation, with some unique solutions to environmental challenges. The city is visually appealing and functionally effective.</p>	<p>Shows some creativity, but the city design may rely on conventional solutions or lack visual appeal. The functional aspects may be underdeveloped.</p>	<p>Shows little creativity or innovation, with a city design that is conventional, visually unappealing, or functionally ineffective.</p>
<p>Research and Information Integration</p>	<p>Conducts thorough research on sustainable urban development, effectively integrating findings into the city design and presentation. The research is evident in all aspects of the project.</p>	<p>Conducts good research, with findings well-integrated into the city design and presentation. The project reflects a solid understanding of sustainable urban development.</p>	<p>Conducts basic research, but the integration into the city design and presentation may be limited or unclear. Some aspects of the project may lack research support.</p>	<p>Conducts little or no research, resulting in a project that lacks depth, accuracy, or effective integration of sustainable urban development concepts.</p>

<p>Collaboration and Teamwork</p>	<p>Works exceptionally well with team members, contributing ideas, respecting others' opinions, and creating a cohesive, well-executed project. Actively participates in all group discussions and tasks.</p>	<p>Works well with team members, contributing to discussions and tasks. Shows respect for others' ideas and participates in most group activities.</p>	<p>Works with team members but may struggle with communication or participation. Contributions may be uneven or inconsistent.</p>	<p>Struggles to work with team members, showing little participation or contribution. May hinder the group's progress or create conflicts.</p>
<p>Presentation and Explanation</p>	<p>Delivers a clear, detailed, and engaging presentation of the city, effectively explaining the eco-friendly features and design choices. The presentation is well-organized and informative.</p>	<p>Delivers a clear and accurate presentation of the city, explaining the eco-friendly features and design choices. The presentation is well-organized and generally informative.</p>	<p>Delivers a basic presentation, but some aspects may be unclear, underdeveloped, or poorly organized. The explanation of eco-friendly features may lack detail.</p>	<p>The presentation is unclear, lacks detail, or is poorly organized. The explanation of eco-friendly features is incomplete or ineffective.</p>

Activity 8: Musical arrangement

Criteria	4 - Advanced	3 - Proficient	2 - Developing	1 - Beginning
Accuracy and Fidelity to Original Melody	The arrangement is highly accurate, closely following the original melody with precise note placement, timing, and harmony. The chosen sounds and instruments effectively replicate the original piece.	The arrangement accurately follows the original melody, with correct note placement and timing. The chosen sounds and instruments are appropriate and resemble the original piece.	The arrangement partially follows the original melody, but may have some inaccuracies in note placement, timing, or sound selection. The piece may not fully capture the essence of the original.	The arrangement is largely inaccurate, with significant errors in note placement, timing, or sound selection. The piece does not effectively resemble the original melody.
Use of Sound and Instrumental Variety	Demonstrates exceptional use of the different available sounds and instruments, creatively selecting and combining	Effectively uses a variety of sounds and instruments, appropriately selecting and combining them to create a cohesive	Uses some variety of sounds and instruments, but the selection may be limited or not fully effective in enhancing the	Shows little or no variety in the use of sounds and instruments. The arrangement may be monotonous,

	<p>them to enhance the musical arrangement. The variety adds depth and richness to the piece.</p>	<p>musical arrangement. The variety contributes positively to the piece.</p>	<p>musical arrangement. The piece may lack depth or cohesion.</p>	<p>with poorly chosen or underutilized sound options.</p>
<p>Timing and Rhythm Control</p>	<p>Demonstrates excellent control over timing and rhythm, with precise use of repeaters and redstone to create a smooth, well-paced musical arrangement. The rhythm is consistent and effectively supports the melody.</p>	<p>Demonstrates good control over timing and rhythm, using repeaters and redstone to create a well-paced musical arrangement. The rhythm is generally consistent and supports the melody.</p>	<p>Demonstrates basic control over timing and rhythm, but there may be some inconsistencies or issues with pacing. The use of repeaters and redstone may be somewhat effective, but not fully refined.</p>	<p>Shows little control over timing and rhythm, with significant issues in pacing. The use of repeaters and redstone is ineffective or poorly executed, leading to a disjointed arrangement.</p>
<p>Creativity and Innovation</p>	<p>Shows exceptional creativity and innovation in arranging the melody, incorporating unique</p>	<p>Shows good creativity and innovation, with some unique elements or variations that add interest to</p>	<p>Shows some creativity, but the arrangement may rely heavily on the original melody without much variation or innovation.</p>	<p>Shows little or no creativity or innovation, with a basic, unoriginal arrangement that closely mimics the</p>

	elements, variations, or improvisations that enhance the piece while staying true to the original.	the arrangement while maintaining the integrity of the original piece.	The piece may lack originality or distinctiveness.	original without adding any new elements.
Technical Execution (Redstone and Note Blocks)	The arrangement is technically flawless, with all redstone circuits, note block placements, and timings functioning perfectly. The setup is clean, organized, and demonstrates a strong understanding of the technical aspects.	The arrangement is technically sound, with most redstone circuits, note block placements, and timings functioning correctly. The setup is organized and demonstrates a good understanding of the technical aspects.	The arrangement is functional but may have some technical issues or inconsistencies in redstone circuits, note block placements, or timings. The setup may be somewhat disorganized or unclear.	The arrangement has significant technical issues, with many redstone circuits, note block placements, or timings not functioning correctly. The setup is disorganized and demonstrates a lack of understanding of the technical aspects.
Presentation and Explanation	Delivers a clear, detailed, and engaging presentation of the musical arrangement,	Delivers a clear and accurate presentation, explaining the choices made, the process, and	Delivers a basic presentation, but some aspects may be unclear, underdeveloped, or poorly	The presentation is unclear, lacks detail, or is poorly organized. The

	effectively explaining the choices made, the process, and the challenges encountered. The presentation is well-organized and insightful.	the challenges encountered. The presentation is well-organized and informative.	organized. The explanation of choices and process may lack detail.	explanation of choices and process is incomplete or ineffective.
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Activity 14: Voxel geometry

Criteria	4 - Advanced	3 - Proficient	2 - Developing	1 - Beginning
Accuracy of Geometric Decomposition	The decomposition of the monument into geometric figures is highly accurate and detailed. All major geometric elements are clearly identified and represented correctly.	The decomposition of the monument is accurate, with most major geometric figures identified. Some minor details may be missing or slightly incorrect.	The decomposition shows a basic understanding of geometric figures. Some important elements may be misidentified or missing.	The decomposition of geometric figures is inaccurate or incomplete. Many important elements are misidentified or missing.
Recreation of Monument in Minecraft	The recreated monument is highly	The recreated monument is recognizable	The recreated monument is somewhat	The recreated monument is not clearly

	recognizable and closely matches the original in terms of major geometric features. The use of blocks effectively represents the geometric decomposition.	and mostly matches the original, with clear representation of major geometric features. Some details may be less accurate.	recognizable, with basic geometric features represented. The use of blocks shows some understanding of the decomposition but may have inaccuracies.	recognizable or significantly deviates from the original. The use of blocks does not effectively represent the geometric decomposition.
Geometric Accuracy in Minecraft	The geometric figures are accurately and clearly represented in the Minecraft model. The blocks used align well with the identified geometric shapes and structures.	The geometric figures are generally well-represented in the Minecraft model. Most blocks align with the identified geometric shapes, though some inconsistencies may be present.	The geometric figures are partially represented in the Minecraft model, with noticeable misalignments or inaccuracies in block placement.	The geometric figures are poorly represented in the Minecraft model. Blocks do not align with identified geometric shapes, leading to significant inaccuracies.
Clarity and Presentation	The project is presented clearly and professionally. The students provide a	The project is presented clearly with a good explanation of geometric	The project presentation is basic, with a general explanation of geometric	The project presentation is unclear or disorganized. The explanation of

	thorough explanation of their geometric decomposition and how it was implemented in Minecraft. Visual aids are effective.	decomposition and Minecraft implementation. Some visual aids may be used, with minor issues.	decomposition and Minecraft implementation. Visual aids may be unclear or lacking.	geometric decomposition and Minecraft implementation is minimal or confusing, with poor or no visual aids.
Collaboration and Teamwork	The group works exceptionally well together, with all members contributing equally to the project. Collaboration is seamless and enhances the overall quality of the work.	The group works well together, with active participation from all members. Collaboration is generally effective, though some areas may show minor issues.	The group demonstrates basic collaboration, but there may be issues with participation or uneven contribution from members. The overall quality of teamwork is affected.	The group struggles with collaboration, with significant issues in participation and contribution from members. The overall quality of teamwork is poor.

Activity 15: Natural reservoir

Criteria	4 - Advanced	3 - Proficient	2 - Developing	1 - Beginning
Accuracy of Natural Reservoir Design	The reservoir is highly realistic, accurately reflecting a natural	The reservoir is realistic with good representation of a natural	The reservoir shows a basic understanding of natural ecosystems.	The reservoir is unrealistic or poorly represents a natural ecosystem. Many elements are

	ecosystem with diverse plant and animal life. The design is well-researched and closely aligns with real-life examples.	ecosystem. Most plants and animals are accurate, with minor deviations from real-life examples.	Some elements are accurate, but there are noticeable inaccuracies in plants, animals, or overall design.	inaccurate or missing, with little resemblance to real-life examples.
Inclusion of Plants and Animals	The reservoir includes a wide variety of plants and animals that are well-researched and appropriate for the chosen biome. The ecosystem is rich and diverse.	The reservoir includes a good variety of plants and animals, with most being appropriate for the chosen biome. There is some diversity but could be more extensive.	The reservoir includes a limited variety of plants and animals, with some elements being inappropriate for the chosen biome. Diversity is minimal.	The reservoir includes few plants and animals, with many being inappropriate for the biome. The ecosystem lacks diversity and does not reflect real-life examples well.
Ecological Accuracy and Protection	The students demonstrate a thorough understanding of ecological principles, including the role of each species in the	The students show a good understanding of ecological principles and protection, with most aspects of the ecosystem being well-	The students show a basic understanding of ecological principles and protection. The ecosystem design has	The students show limited understanding of ecological principles and protection. The ecosystem design is poorly maintained and lacks

	ecosystem. The design shows a strong focus on protecting and maintaining the ecosystem.	represented. Some elements may need improvement.	some issues with protection and maintenance.	consideration for protection.
Clarity and Explanation	The project is presented clearly and professionally, with a detailed explanation of the reservoir's ecosystem, including the choice of plants and animals and protection measures.	The project is presented clearly, with a good explanation of the reservoir's ecosystem and the choice of plants and animals. Some details about protection measures may be less thorough.	The project presentation is basic, with a general explanation of the reservoir's ecosystem. The explanation of plants, animals, and protection measures is incomplete.	The project presentation is unclear or disorganized. The explanation of the ecosystem, plants, animals, and protection measures is minimal or confusing.
Use of Previous Knowledge (Activity 5)	The students effectively apply knowledge from Activity 5 to enhance their reservoir design. The project integrates previous learning seamlessly and	The students apply knowledge from Activity 5 to their reservoir design, with good integration of previous learning. Some connections to climate diversity are evident.	The students apply some knowledge from Activity 5, but integration into the reservoir design is basic. Connections to climate	The students show limited application of knowledge from Activity 5. Integration into the reservoir design is minimal, and connections to climate diversity are not evident.

	shows a deep understanding of climate diversity.		diversity may be unclear.	
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Activity 16: Castle programming

Criteria	Block master	Journeyman	Improving	Start line
Understanding of Commands	Demonstrates excellent understanding of multiple Minecraft commands, using them correctly and creatively in various contexts.	Demonstrates a good understanding of basic Minecraft commands, using them correctly with minor errors.	Shows some understanding of basic commands but struggles with correct usage and application.	Has difficulty understanding and applying Minecraft commands correctly.
Sequencing Commands	Commands are sequenced logically and effectively to achieve the desired outcome without any errors.	Commands are mostly sequenced correctly with minor mistakes that do not affect the overall outcome.	Attempts to sequence commands but makes mistakes that occasionally disrupt the outcome.	Struggles to sequence commands correctly, leading to significant errors in the outcome.
Use of Loops	Effectively uses loops to simplify	Uses loops correctly to simplify tasks,	Attempts to use loops but with errors or	Does not use loops or uses them

	repetitive tasks, creating efficient and complex structures.	though some tasks may still be done manually.	limited understanding of their purpose.	incorrectly, leading to inefficiency or incomplete tasks.
Application of Conditionals	Creatively and correctly uses conditionals to create interactive elements or structures in the game.	Uses conditionals correctly but may need some guidance to apply them effectively.	Attempts to use conditionals but struggles with correct syntax or understanding.	Does not use conditionals or does so incorrectly, with little understanding of their function.
Problem-Solving & Creativity	Demonstrates excellent problem-solving skills, creatively overcoming challenges with innovative solutions.	Shows good problem-solving skills, successfully overcoming most challenges with practical solutions.	Shows some problem-solving ability but may need guidance to overcome challenges.	Struggles to solve problems, relying heavily on assistance or unable to complete tasks independently.
Collaboration & Participation	Actively participates, collaborates effectively with peers, and shares ideas to	Participates well and collaborates with peers, contributing to group tasks	Participates occasionally but may need encouragement to collaborate	Shows little participation or collaboration, needing significant encouragement

	enhance group learning.	and discussions.	effectively with peers.	to engage with the activity.
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