



AI-Cosmic Handbook:

A practitioner's

approach to AI and Coding in Minecraft

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Introduction

In today's rapidly evolving technological landscape, it is becoming increasingly important for young students to have a basic understanding of artificial intelligence (AI) and coding. These skills are not only relevant to the future job market but also play a crucial role in shaping our daily lives.

Incorporating AI and coding into primary education can help students develop critical thinking skills, problem-solving abilities, and logical reasoning. Students can learn to approach complex problems in a structured manner and find solutions by breaking them down into smaller, manageable pieces. They can also learn to think creatively and come up with innovative solutions to real-world problems. Moreover, it is becoming increasingly clear that understanding how coding and AI work will be an essential skill set in the future work environment. Therefore, it is crucial that students begin adapting to this knowledge at a young age. Even jobs that do not explicitly require coding skills often benefit from having employees who can understand and work with technology. Having a basic understanding of AI can be valuable, as AI is being integrated into many industries, from healthcare to finance.

Beyond the job market, understanding AI and coding is crucial for citizens in the digital age. AI-powered algorithms and systems play a significant role in shaping our lives, from the content we see on social media to the recommendations we receive from e-commerce websites. A basic understanding of how these systems work can help individuals make informed decisions and protect themselves from being manipulated or misled. Incorporating AI and coding into primary education can also help bridge the gender gap in STEM (Science, Technology, Engineering and Mathematics) fields. Historically, STEM fields have been male-dominated, and women have been underrepresented. By introducing coding and AI at a young age, we can encourage girls to explore these fields and break down gender stereotypes.

This handbook will seek to define and explore the realms of coding and Artificial Intelligence for primary educators, in current use by survey respondents, then explore the game platform Minecraft Education edition and its uses in a modern curriculum.



International Survey

During the first steps of the project AI-Cosmic, the consortium ran a survey among various formal and non-formal educators in the 6 participating countries (Latvia, The Netherlands, Greece, Italy, Spain and Croatia) on the use of AI and Coding in primary schools. From this survey, the analysis of each national desk research highlights a disparity among educators in Europe in terms of familiarity with digital tools using AI and Coding concepts (see Appendix 3). Therefore, it is noticed that there is room for further education and exploration of AI and coding concepts in primary schools, knowing that every educator would recommend the use of related tools in teaching environment. The active use of digital tools with AI and Coding elements in the teaching environment is a response to the positive views towards these tools, which emphasises the significance of these elements in the educational context, as well as their importance in today's society. Indeed, most of the educators would recommend teaching AI and coding concepts to students from 9 to 12 years old, as these concepts tend to develop skills such as problem-solving, creativity, and critical-thinking. However, some educators from Italy and Croatia would also teach these concepts to younger students, starting from kindergarten. In the same way, digital tools are seen as a motivating teaching method as the level of commitment from the students is expected to be high in most cases.

From the comparative analysis, it can be seen that the most popular tools are game-based and web-based ones, and are very convenient to teach subjects other than AI and coding, such as Maths and Technology. Some tools are very popular among the educators such as Kahoot, Minecraft, Roblox, Quizziz, Scratch, Java and Python. As most of the time, the use of digital tools using AI and coding concepts are from the initiative of the educators themselves, educational institutions only show a few efforts to enhance AI literacy among the students. It might explain the low familiarity level of Spanish educators with such tools, which could be resolved if the institutions would provide access to the tools themselves. Indeed, institutions play an important role when it comes to the widespread use of digital tools as an educational licence is required to access some of them. The importance of new initiatives is highlighted by the fact that educators would in general recommend their use to others but they admit lacking of training on how to use AI and coding tools or financial resources. Finally, as it can be observed that Italian educators tend to only use a few tools while Latvian educators have a wider range of resources, there is a need to create initiatives



that would facilitate the understanding of these tools and would train and motivate educators to use it in their teaching. In the same way, not all participants declare facing other obstacles but Greek educators mention facing a few challenges regarding accessibility or quality, such as the old aspects of the tools or the lack of performances.

To sum-up, the international survey reveals the need for training initiatives for teachers to include AI and coding concepts in their teaching through digital tools. As much as many tools are already used by European educators, their familiarity with such tools seem to remain low while educators are interested to diversify their teaching tools and acknowledge the growing importance of AI and Coding in society and in student's skillset for their future career.

AI Principles and Concepts

Artificial Intelligence (AI) is a broad field of study concerned with creating machines which appear to 'think' and behave like humans in a way we would consider 'smart'.

Machine Learning is a popular approach to AI where machines are fed lots of real-world data – pictures, text, graphs, audio clips for example – and the machine is able to learn from these.

In essence, the objective of AI is to develop tools that can be used in various technologies to enable computers and machines to develop problem-solving and decision-making processes. Indeed, lists of instructions called algorithms aim to give computers and machines the ability to perform tasks usually done by living human beings. As it requires learning and thinking competences, AI tools use combinations of sets of programs to operate computers and physical elements, in other words software and hardware. Therefore, it enables the ingestion of a lot of accessible data, and the identification of correlations between these data. By creating and using such patterns, as well as perceptual learning aspects, memory and critical reasoning capacities, AI is able to make predictions or suggestions.



Figure 1: AI and machine learning around us: How many do you use?

AI & machine learning around us: How many do you use?





Netflix uses machine learning to create its recommendations for shows you might like.



Google uses machine learning to read street signs and house numbers from its street view photos to improve the accuracy of its maps.

It also uses machine learning to automatically blur sensitive information, such as people's faces.



Image recognition phone features are powered by machine learning, enabling you to search for pictures of your cat!

Social media of including inter posting picture

Social media uses AI in numerous ways, including interpreting what you're discussing, or posting pictures of, to better target advertising.

Source: computingatschool.co.uk

- Machine learning is already shaping the world around us in surprising and exciting ways. Machine learning is the technology that allows computer systems to learn directly from examples, data, and experience. By allowing computers to perform specific tasks intelligently, machine learning systems can carry out complex processes by learning from data, rather than by following fixed rules. This technology is developing at a rapid pace due to the growing availability of data, increased computing power, and technical advances which have created more powerful algorithms.
- Doctors diagnose some diseases by looking at samples of tissues, for example, skin cells and analysing these for signs that they are unhealthy. Using machine learning to help with this type of analysis can improve the accuracy of diagnoses and help doctors understand how cells are affected by diseases such as cancer.
- Recommender systems, systems which recommend products on the basis of previous choices – are amongst the most well-known uses of machine learning. These systems are used by a range of online companies, such as Amazon and Netflix, to analyse data generated by customers' purchases or web browsing habits. This data, and



similar data from the purchases of others, can then be used to give tailored shopping recommendations, for movies, clothes, books, or other products. One issue that these systems need to deal with is making sure they don't inadvertently discourage customers from trying new or unfamiliar products. They also need to make sure that product ratings aren't skewed by a small number of people who use the service more frequently.

Further developments in retail could include highly automated shopping experiences, such as those being developed by Amazon, in which shoppers and their product selections are automatically detected as they move through the store, and charges made automatically. This uses a combination of sensor technology and machine learning, which supports the computer vision needed to follow what shoppers are buying.

- Machine learning is increasingly being used in law enforcement. Police stations may operate very differently in the future. Some police forces are using machine learning to help them predict where and when crimes are likely to take place. Machine learning systems like <u>PredPol</u> are fed thousands of reports of previous crimes. All personal data is removed. It uses three types of data about previous incidents, the type of crime, place of crime and time of crime, to create a map, which updates every day to take in to account recent events. The system can make a prediction about which areas might be crime hotspots over the next 24 hours based on previous patterns. This allows police forces to concentrate their resources on the areas where crime is likely to occur. Some people are skeptical about the use of machine learning in this type of predictive policing, for example suggesting that focusing on previous crimes might reinforce stereotypes about an area, or that focusing on reported crimes might miss other potentially important data.
- The way food is grown has already changed because of machine learning.
 Programs such as LettuceBot can use machine learning to photograph 5,000 young plants a minute and decide which are crops and which are weeds. Robotic agricultural machinery then removes the weeds.
- Machine learning is helping to transform our understanding of the universe. In July 2012, physicists from the Large Hadron Collider (LHC) announced that they had discovered the Higgs Boson. This plays an important role in our understanding of



particle physics, and plays a role in giving matter mass. Particles called protons are fired round the LHC at speeds of around 300 million meters per second. When they collide, there is so much energy that they can create new particles. These are detected by the Collider as they are produced and as they break down. There can be up to 600 million collisions per second, creating a huge amount of data. Only a tiny proportion of these collisions will contain rare particles like the Higgs, and not all of the data can be stored. A machine learning algorithm helped detect the Higgs Boson from the noise created by all these collisions. Using simulations of how the creation of the Higgs would look, an algorithm was trained to detect its characteristics from the range of other collisions taking place. This meant that the system could detect it faster and more effectively.

- Machine Learning could help the efficiency of drug discovery. By analysing data about the structure and characteristics of different potential drugs, and how cells react to them, machine learning can predict which substances are likely to be more or less effective at treating a disease. Those which are most likely to be effective can then be selected for further development.
- Driverless cars use a large number of different machine learning systems to navigate the world around them, such as edge detection to keep them on the right side of the road, or road sign detection to help them navigate and react. Autonomous vehicles, or elements of autonomous driving, are increasingly being tested or used on roads.

Artificial Intelligence - the big 5 ideas!

Perception; Representation and Reasoning; Learning; Natural Interaction; Societal Impact.

- Perception, involving the ability of machines and computers to perceive the world using sensors.
- Representation & Reasoning, as AI uses different types of representation to support reasoning and problem-solving.
- Learning, as AI uses networks of data to acquire knowledge and improve performance.
- Natural Interaction, interactions being possible with various forms of knowledge such as consciousness and intuitions.
- Social Impact, which can be both positive and negative.



By exploring and comprehending these five dimensions, students can gain a deeper understanding of artificial intelligence and its applications. The use of these five ideas and the way artificial intelligence is divided provides a framework for teachers aiming to familiarise their audience with artificial intelligence in general.

AI tools are everywhere! Figure 2 shows some of them:



Figure 2: AI Software to explore

Source: facebook_1690194621026_7089190059750301418.jpg



Some other popular AI for educators, introduction to AI and AI tools:

| <u>Tcea.org</u> – | Edugpt.com – |
|--|--|
| How to create a responsible use policy for | Provides educators with dozens of pre- |
| AI in education and its impacts on | trained bots supporting hundreds of prompt |
| Teachers. | requests |
| aws.amazon.com – | Sherpalabs.co – |
| Outsmart ChatGPT 8 tips for creating | Brings your readings to life. |
| assignments it can't do. | |
| dayofai.org – | briskteaching.com – |
| Curriculum, developed by leading faculty | Assess student effort and AI writing. |
| and educators from MIT RAISE | |
| (Responsible AI for Social Empowerment | |
| and Education). | |
| Ditchthattextbook.com – | Magicschool.ai – |
| Lesson planning with AI, save time and | AI for teachers, lesson plans and more. |
| get ideas. | |
| Gamma.app – | <u>Conker.ai</u> – |
| Presenting ideas. | Create quizzes and export directly to Google |
| | forms. |
| <u>Canva.com</u> – | Driffit.me – |
| Magic design. | |
| <u>Cohesive.so</u> – | Questionwell.org – |
| Seamlessly create, refine and edit work. | A question generator. |
| Scribblediffusion.com - | <u>Nolej.io</u> – |
| Turn a sketch into a refined image. | A decentralizes skills platform that generates |
| | interactive courseware and global knowledge |
| | graphs. |
| Educationcopilot.com – | Lessonlabai.com – |
| Lesson plans, PowerPoints and more. | Lesson plans, example texts, reports and |
| | more. |
| <u>Slidesgpt.com</u> – | Perplexity.ai – |
| Creates decks on any topic in seconds. | Chatbot, but can choose where information |
| | comes from. |



| Eduaide.ai – | Goblin.tools – |
|---------------------------------------|---|
| Provides sets of tools to express | Possible use for SPED students, breaks down |
| creativity, expertise and planning. | assingments into smaller tasks. |
| <u>Twee.com</u> – | Otter.ai – |
| Tweaks lessons, targets ELAR and can | Voice meeting notes and real time |
| make questions for You Tube videos. | transcription, recorded audi, automated slide |
| | capture. |
| <u>Glasp.co</u> – | <u>Curipod.com</u> – |
| Social web highlighter and annotation | Makes interactive lessons filled with |
| tool. | creativity, reflection and critical thinking. |



The Principles of Game Based Learning

Any student using AI principles / coding will grow in confidence in all learning, by taking risks and making mistakes as part of a creative process. They will increase thinking skills and problem-solving skills.

When students can use AI principles / coding during learning they increase in creative stamina and learn how to navigate through mental blocks when brainstorming. This is also a transferable skill to all other subject areas. Similar to real-world collaboration in any creative industry, students have the opportunity to give and receive constructive feedback and grow in their social skills.

Figure 3: 6 Principles of game-based learning



Source: education.minecraft.net

Different than gamification (quizzifying your lesson), this is an immersive experience in a creative world. The six principles are:

- The failure dynamic of failing early and often—it's a safe environment for risk
- The flexibility dynamic means the possibilities are endless and perfect for differentiation. Students can build things related to any curriculum.



- The construction dynamic is building something that matters—students love creating things with purpose. Start to dream students can build in Minecraft that they can't anywhere else.
- The situated meaning principle means students are learning in real-time with real meaning.
- Systems thinking is so powerful, as your actions or builds affect the community or world.
- It helps build empathy—players can communicate and work together collaboratively to build some pretty spectacular things.

Teaching and Learning Coding

According to research, teaching coding in primary schools is important as it can help students develop essential skills for success, such as critical thinking and problem-solving skills, creativity, and collaboration abilities.

Coding skills can be applied in a wide range of daily activities and can help pupils improve their problem-solving skills, boost their creativity, and enhance their computational thinking abilities. For instance, coding can be used to create and design websites and applications, allowing pupils to express their creativity and share their interests with what surrounds them on a daily basis. Additionally, coding can be used to automate repetitive tasks such as data entry, which can save time and improve efficiency in school projects and assignments. Coding can also be used to develop various types of solutions to real-world problems, such as developing apps to track and reduce waste, creating games to raise awareness of environmental issues, or building robots to assist people with disabilities for example. Indeed, coding can be used to control and program various types of hardware, such as drones, robots, and microcontrollers. These applications of coding can help pupils develop an entrepreneurial mindset and a desire to make a positive impact in their community and the world. Pupils can become familiar with how to program various devices and use them to perform various easy tasks. In summary, coding skills are highly valuable and can be applied in various aspects of daily life, from expressing creativity to developing solutions for real-world problems. By learning to code, pupils can develop essential skills



and knowledge that can help them succeed in the 21st-century workforce and make a positive impact in their community and the world.

Firstly, learning to code helps students develop logical thinking and problem-solving skills that are valuable not only in programming but also in many other areas of life. As they write code, they learn to break down complex problems into smaller, more manageable pieces, and to use logical reasoning to find solutions. Secondly, coding teaches students creativity and innovation. When students learn to code, they gain the ability to create new software and applications, which can lead to innovation and entrepreneurship. For example, students can bring their ideas to life using coding knowledge and can create their own mobile apps or websites. Finally, teaching coding in schools helps bridge the gap between technology and society. Coding is a fundamental part of modern technology, and by teaching it in schools, we can ensure that more people are equipped with the skills needed to understand and work with technology.

Teaching coding in schools is becoming increasingly important in preparing students for success in the digital age. By developing logical thinking, problem-solving skills, creativity, and innovation, students can gain a competitive advantage in the job market and be better prepared to work with technology in the future.

Firstly, some definitions:

Algorithm:

An algorithm is a set of step-by-step instructions that help solve a problem or complete a task. In coding, an algorithm is like a recipe that guides a computer program on what actions to take. Algorithms can be simple or complex, but they always follow a logical order of operations.

Sequence:

In coding, sequence refers to the specific order in which instructions are given to the computer. Just like following a recipe, the computer needs to execute the instructions in the correct sequence to achieve the desired outcome. If the instructions are out of order, the program may not work as intended.



Selection:

Selection is an important concept in coding that involves making decisions based on certain conditions. One common way to implement selection is by using IF-THEN statements. These statements allow the program to choose different paths or actions based on whether a condition is true or false. For example, if a certain condition is met, the program can execute one set of instructions, but if the condition is not met, it can execute a different set of instructions.

Abstraction:

Abstraction in coding refers to simplifying complex problems by breaking them down into smaller, more manageable parts. It allows programmers to focus on the essential details while hiding unnecessary complexities. For example, block-based coding platforms like Scratch provide an abstraction layer that allows students to create complex programs using visual blocks instead of writing original code.

Decomposition:

Decomposition is the process of breaking down a complex problem into smaller subproblems. By dividing a problem into smaller parts, it becomes easier to understand and solve. Decomposition helps programmers tackle large tasks by addressing each subproblem individually. For example, when creating a pac man game in Scratch, students decompose the game into smaller components like movement, interactions, and scoring.

Coding is like learning a new language, and these concepts are the building blocks that help communicate with computers.



Basics Of Coding With Block-Based Coding

Studio of code and Hour of Code are popular and teaching coding fundamental platforms, offering courses and coding experiences for Kindergarten to Grade 12.

Figure 4 is one example lesson of using blocks to code the drawing of basic shapes, for grades 1-5:

Figure 4: Example lesson (grades 1-5)

| C 0 D E | Lesson 10: Artist: Shapes 100000000 More |
|-------------|--|
| | Lesson 10: Artist: Shapes 1 Concentrations Instructions Draw a square below the triangle. Blocks When run When run S S S S S S S S S S S S S |
| C English V | |

Source: studio.code.org/s/course1/lessons/10/levels/1

Figure 5 is a more advanced lesson from course 2 from grade 4-5 +.

Coding with blocks is a logical, intuitive and engaging way to teach and learn coding principles. Teachers can create accounts that link to Google classroom, Teams and other ways to connect and share with students in the classroom. There are progress tracking tools and other valuable facilities.



| | Lesson 10: Bee: Debugging 100000000 🕫 📈 |
|---------------------------------------|---|
| | Instructions For Teachers Only |
| | These blocks are really bugging me! Fix the error(s) to collect all of the nectar. |
| | Blocks Workspace: 5 / 4 blocks |
| | move forward when run move forward |
| <u> </u> | turn [eft 5 T move forward move forward |
| Step | turn (right 0) get nectar |
| Need help? See these videos and hints | get pectar |
| Ree Debugaing | repeat 222 times do |
| 🗿 English 🗸 🎯 | |

Figure 5: Example lesson (Grades 4-5+)

Source: studio.code.org/s/course2/lessons/10/levels/1

Basics Of Coding With Python – Text-Based Coding

Python is a popular programming language used by many developers around the world. It is known for its simplicity and readability, making it a great language for beginners to learn. One of the first things you learn when starting with Python is how to print messages on the screen. A common tradition in the programming world is to start with a simple program called "Hello World." It's a way to greet the world and get familiar with how coding works.

To write the "Hello World" program in Python, we use the print () function. This function allows us to display text on the screen. Let's take a look at an example:

```
```python
print ("Hello, World!")
```
```

When you run this program, you will see the message "Hello, World!" printed on the



screen. It may seem simple, but it is the first step towards understanding how coding works.

Variables and How They Work

In programming, variables are like containers that store information. They have a name and a value. You can think of them as boxes that hold different things. Let's learn more about variables with an example.

Imagine you want to create a program that greets someone by their name. You can use variables to store the person's first name and surname. Here's an example:

```python
firstname = "John"
surname = "Doe"
print ("Hello,", firstname, surname)

In this example, we have created two variables: `firstname` and `surname`. The value of `firstname` is "John" and the value of `surname` is "Doe". By using the print () function, we can combine these variables with the text "Hello," to create the greeting.

When you run this program, it will display "Hello, John Doe" on the screen. The variables act as placeholders for the actual values. You can name variables anything meaningful that you like.

By using variables, we can make our programs more dynamic and flexible. We can change the values stored in variables, and our program will adapt accordingly.

In another example in figure 6, the hashtags act as notes for the program and carry out no action in Python. Two variables have been created and named, "greeting" and "myname".



### Figure 6: Python example

| 1 | # Say Hello!                         |
|---|--------------------------------------|
| 2 | <pre>greeting = "Hello World!"</pre> |
| 3 | say(greeting)                        |
| 4 | <pre># Introduce yourself!</pre>     |
| 5 | myname = "Anonymous"                 |
| 6 | say(myname)                          |
| 7 | # try both                           |
| 8 | <pre>say(greeting,myname)</pre>      |

Source: Python

Selection is another really vital concept in basic programming. Selection is basically making a decision using an IF statement, with a test condition. IF the condition is true, THEN an action is carried out, IF the condition is FALSE, then another action is carried out. You can also think of it as, IF this is true, THEN do this, or ELSE, do that.

You can see how variables and the selection concept work in the code section in figure 7.

Figure 7: Variables and selection concept example

```
● ○ ○ teenager.py – /Users/jkershaw/Documents/Reference/Coding/Python/teenager.py
BABY = 1
TODDLER = 2
CHILD = 12
TEENAGER = 19
0LD = 30
name = input ("What is your name? ")
age = input ("How old are you? ")
age = int(age) # make sure age is an INTeger (whole number)
print ("You were a baby", age - BABY, "years ago.")
print ("You were a toddler", age - TODDLER, "years ago.")
if age > CHILD:
 print ("You were a child", age - CHILD, "years ago.")
if age > TEENAGER:
 print ("You were a teenager", age - TEENAGER, "years ago.")
if age > OLD:
 print ("You are very old!")
```

Source: Python, teenager.py.



Variables are defined and the values set. The text strings are established using the brackets and speech marks. The selection with numerical values uses the operator, "greater than". The selection makes the decision about the values. IF a variables value meets the test condition, then the output is given. Or else, the program moves onto the next line of code.

### What is Minecraft Education?

Minecraft Education Edition is one of the most powerful game-based learning tools available for schools today. It offers an immersive experience that allows students to display their understanding of a topic through the power of play.

Minecraft Education supports teaching and learning through a game-based platform and interface that promotes creativity, collaboration, and problem-solving in an immersive digital environment where the only limit is the learner's imagination.

Minecraft Education Edition Summary:

- Game based learning that students love
- Drives social-emotional and STEM learning
- Security, multiplayer and assessment features
- Immersive, standards-aligned and engaging content across subjects
- Available for Windows, Mac, iPad, and Chromebook via O365 Education and M365

It provides an interactive digital environment that allows students to create learning for all to see. Students can create in an engaging virtual world and demonstrate their learning of key concepts by using tools to capture progress and document learning.

It can be simply defined in curriculum terms as game-based learning, which uses the teach, release, reflect model of instruction.

An important distinction for educators and teaching practitioners:



Game-based learning: Game-based learning is leveraging games for learning.

**Gamification**: Gamification is the application of game-design elements and game principles into learning, for example using interactive quizzes electronically in Blooket, Quizzis or Quizlet. Or quiz platforms like Bamboozle.

The motivating factor of being immersed in the game, rather than playing a game or quiz cannot be understated.

### Teaching and Learning with Minecraft

Minecraft can be applicable to a variety of curriculum subject areas

**Maths:** Minecraft can be used to teach maths concepts such as geometry, fractions, and statistics. For example, students can use Minecraft to build and explore 3D shapes or create a farm and collect data on the number of crops harvested.

- Minecraft can be used to support math learning by creating structures and environments that require students to apply math concepts such as geometry, measurement, and spatial reasoning. For example, students can design and build structures that require them to calculate the area or volume of shapes.
- In game: Students can use Minecraft to create and explore geometric shapes, such as pyramids, spheres, and cylinders. They can use the tools within Minecraft, such as the measuring stick and coordinates, to practice calculating the perimeter, area, and volume of these shapes.

**Science:** Minecraft can be used to teach science concepts such as ecosystems, geology, and physics. For example, students can create a virtual ecosystem and observe how different organisms interact or create a model of a volcano and simulate an eruption.

• Minecraft can be used to support science learning by creating simulations and experiments that allow students to explore scientific concepts such as



ecosystems, physics, and chemistry. For example, students can create virtual ecosystems and observe how different organisms interact.

 In game: Students can use Minecraft to simulate scientific experiments, such as creating a volcano and observing its eruption, or creating a circuit and testing its electrical properties. They can use the data collected in Minecraft to analyse and draw conclusions about the scientific concepts being explored.

**History:** Minecraft can be used to teach history concepts by creating historical buildings or monuments and exploring them. For example, students can build a replica of the Colosseum or the Pyramids of Giza and learn about their historical significance.

**Language Arts:** Minecraft can be used to teach language arts concepts such as storytelling and creative writing. For example, students can create a virtual world and write stories or scripts that take place in that world.

- Minecraft can be used to support language arts learning by providing opportunities for students to engage in storytelling, creative writing, and reading comprehension activities. For example, students can create a virtual world and write stories that take place in that world.
- In game: Students can use Minecraft to write descriptive narratives, create dialogue between characters, and practice developing plot and character arcs. They can also use Minecraft to create a virtual book club, where they read and discuss literature in the context of the game.

**Social Studies:** Minecraft can be used to teach social studies concepts such as cultural diversity and global issues. For example, students can build a virtual world that represents different cultures or create simulations of global events such as climate change or pandemics.



- Minecraft can be used to support social studies learning by creating environments that allow students to explore historical events, cultural diversity, and global issues. For example, students can create a virtual world that represents different cultures and examine the social structures and beliefs of those cultures.
- In game: Students can use Minecraft to explore different historical events, such as recreating the Roman Empire or simulating the Industrial Revolution. They can also use Minecraft to examine different cultural practices and beliefs, such as building structures that reflect the architecture and customs of different societies.

#### **Coding/Computational Thinking:**

- Minecraft can be used to support coding learning by providing a platform for students to practice programming concepts such as variables, loops, and conditionals. For example, students can use the Minecraft API to create mods that change the behaviour of the game.
- In game: Students can use Minecraft to practice coding skills by creating simple mods that add new items, change game mechanics, or interact with other Minecraft features. They can also use the Minecraft Command Block to create custom commands and scripts that automate tasks and create interactive experiences.

### **Command Blocks:**

- Command blocks are more advanced Redstone contraptions that can run entire functions inside them (or we can pretend they do).
- In Machine Learning/AI we use different methods regarding neural networks, that in most cases are acting like a "black box" of some sorts. Command blocks fit into this narrative perfectly as it is exactly what they do in the Minecraft games already.



• A good example regarding command blocks is having a player perform a task and depending on different variables, the command block can produce a different result. (Like gathering sheep in a pen: one will be alone, two is fine, three is a crowd etc).

### Subject Kit Library

This library houses pre-made lessons in Science, Math, Computer Science, Equity & Inclusion, History & Culture, Social Emotional, Art & Design, Digital Citizenship, Language & Literacy, Esports and Climate & Sustainability. These are designed to help support your curricular areas and intended learning outcomes. There are over 200 hours of lessons in the Computer Science kit alone.

The in-game Subject Kit worlds can be shared and assigned using Teams, Google Classroom, emailing a link, or copying the world file link to paste. Any resources or lessons for the world can be adjusted to meet the needs of any classroom, and there is a Lesson Planner to design the timings, modifications and assessment plans.

There are Recommended Worlds, Starter lessons, Build Challenges, New and Featured lessons, Lesson Collections and most popular lessons to choose from.

Subject Kits accessed from within Minecraft Education edition:



Figure 8: Kit access

Source: Minecraft Education Edition



### Subjects Kits on the Minecraft Education website:

#### Figure 9: Subjects Kits

|                           | SUBJECT KITS                                                      |                          |
|---------------------------|-------------------------------------------------------------------|--------------------------|
| Get started using these s | tarter kits, each with lessons,<br>utorials in core school subjer | downloadable worlds, and |
| ·                         |                                                                   |                          |
|                           |                                                                   | -                        |
| SCIENCE                   | матн                                                              | COMPUTER SCIENCE         |
|                           | _                                                                 |                          |
| LANGUAGE ARTS             | HISTORY & CULTURE                                                 | ART & DESIGN             |
| 4.4                       |                                                                   |                          |
| DIGITAL CITIZENSHIP       | SOCIAL EMOTIONAL                                                  | EQUITY & INCLUSION       |

Source: education.minecraft.net

### Artificial intelligence in Minecraft:

**Machine Learning**: In Minecraft, players can use machine learning to train AI models to do tasks such as sorting items or finding specific blocks. To do this, players can use resources such as Redstone, command blocks, and mods. Students can also use the Microsoft Make Code editor to create custom AI models that can be used in Minecraft.

**Natural Language Processing**: Minecraft can be used to teach natural language processing by using chatbots or NPCs (non-playable characters) that can understand and respond to natural language commands. This can be done using mods such as Chat Triggers or using programming languages such as Python or JavaScript to create custom chatbots.

**Computer Vision**: In Minecraft, players can use computer vision to identify objects and make decisions based on what they see. For example, players can use image recognition to detect specific blocks or structures, or use computer vision to navigate through mazes or obstacle courses.



**Robotics**: Minecraft can be used to teach robotics by using mods such as Computer Craft or Open Computers to create programmable robots that can perform tasks such as mining or farming. Students can also use the Microsoft Make Code editor to create custom code for their robots.

**Data Science**: Minecraft can be used to teach data science by using mods such as Data Pack, which allows players to collect and analyse data from the game. Students can also use programming languages such as Python or R to analyse Minecraft data and create visualizations.

### **Examples**

### Neural Networks

Minecraft can be used to teach neural network concepts by allowing students to create their own virtual neural networks within the game.

✓ For example, students could build a network of interconnected nodes that use weighted connections to process and transmit information, and then use this network to perform a specific task, such as recognizing different types of blocks in the game.

### **Robotics**

Minecraft can be used to teach robotics concepts by allowing students to create and program their own virtual robots within the game.

✓ For example, students could use Minecraft to build a robot that uses sensors to perceive its environment, and then program it to perform tasks such as navigation, obstacle avoidance, or object manipulation.

### **Machine Learning**

Minecraft can be used to teach machine learning concepts by allowing students to create and train their own machine learning models within the game.



- ✓ For example, students could use Minecraft to create a dataset of different types of trees, and then train a model to classify them based on their characteristics, such as size, shape, and colour.
- ✓ The player could make some potions, both via code builder and via Redstone logic.
- ✓ Then, they should divide the objects according to their type. If they are successful, the player can go to the next room, otherwise they have to try again.

### Natural Language Processing:

Minecraft can be used to teach natural language processing concepts by allowing students to create and train their own language models within the game.

✓ For example, students could use Minecraft to create a dataset of different types of blocks and their associated names, and then train a model to recognize and generate these names based on their descriptions or characteristics.

### **Natural Interaction**

Minecraft can allow students to create and program their own virtual agents within the game.

✓ For example, students could create an agent that uses speech recognition and synthesis to interact with the player using natural language

### Perception

Minecraft can allow students to create and experiment with different types of sensory input within the game.

✓ For example, students could create a virtual environment with different types of lighting, sound, and texture, and then observe how these sensory inputs affect their perception of the environment and their ability to navigate and interact within it.



### **Societal Impact**

Minecraft allows students to explore the social, economic, and environmental impacts of virtual and real-world technologies.

✓ For example, students could create a virtual city within Minecraft and analyse how different policies and technologies, such as renewable energy or public transportation, affect the city's economy, environment, and quality of life. Students could also examine real-world examples of how technologies such as AI and robotics are changing society and discuss the ethical implications of these changes.

### The Built-in AI of Minecraft Education

- By using Minecraft's built-in AI students learn about how AI is actually applied in a game and how well it simulates everyday events.
- For example, animals that follow a certain path, are lured by a certain food, avoid danger etc.
- There are fun challenges that can be implemented, for example separate the sheep from the pigs → the sheep tend to avoid wolves and pigs are lured by carrots.
- There can be exploits of the AI for the original games purpose.

### Steps for Installation

It's necessary to have an Office 365 Education with Minecraft licensing in order to teach with Minecraft. Students and educators at eligible institutions can sign up for Office 365 Education for free, including Word, Excel, PowerPoint, OneNote, and now Microsoft Teams, plus additional classroom tools.

You can check eligibility and look at options: microsoft.com/en-us/education/products/office.



If you sign in with your organizations email address, you could see this message which will mean you already have an account.

Figure 10: Office 365 Education - Installation

| Office 365 Education                              |     |
|---------------------------------------------------|-----|
| No need to sign up                                |     |
| You already have a license for Office 365 Educati | on. |
| OK, got it ⊙                                      |     |

Source: microsoft.com/en-us/education/products/office

Before you start, you need to download the Minecraft Education Edition Package according to the requirements of your device. You can find the edition at the following link: <a href="https://education.minecraft.net/en-us/get-started/download">https://education.minecraft.net/en-us/get-started/download</a>

If your computer runs in Microsoft Windows S mode, you need to deactivate the S mode to be able to download the Minecraft Education Edition.

### How to deactivate Microsoft S mode.

Using the Microsoft S mode, the user can only access apps downloaded from the Microsoft App Store. To deactivate the S mode, you need:

- To create a new Microsoft account that is not licensed as a work or school
- Connect this Microsoft account to the laptop
- Then on your PC running Windows 10 in S mode, open Settings > Update & Security > Activation.
- Find the Switch to Windows 10 Home or Switch to Windows 10 Pro section, then select the Go to the Store link.

Note: Don't select the link under Upgrade your edition of Windows. That is a different process that will keep you in S mode.



On the page that appears in the Microsoft Store (Switch out of S mode or a similar page), select the Get button. After you confirm this action, you will be able to install apps from outside the Microsoft Store. You can also find here more information: <u>https://answers.microsoft.com/en-us/windows/forum/all/s-mode-how-to-turn-off-windows-10/53ce25ce-734b-48b8-8d1e-baa5adb5d88b</u>.

To start using the game you need to acquire a **Minecraft Education License**. There are 2 types of licences to be acquired, academic and commercial. Visit the following link to check the license you are eligible for: <u>https://educommunity.minecraft.net/hc/en-us/articles/360061371532-Purchasing-Options-for-Minecraft-Education-Edition-Licenses</u>

### 1.2 Run the worlds

Once you download the Minecraft Education Edition, you need to have the worlds named "McWorld" files. Once you double-click these files, they will automatically open the Minecraft Education system. It will request you log in with the account for which you acquired a license from Microsoft for Minecraft Education. The worlds require the latest Minecraft Education version to work properly.

Another option will be to import the world manually. When loading the game, after adding your credentials, press play and then you will see on the right bottom part the "Import" button.

Do you face any other problems when loading the world? See if any of these solutions might help.

PROBLEM: The world doesn't have any NPC in it.

SOLUTION: That means that the BEHAVIOR PACK didn't load appropriately with the world.

Exit the world (but not the Minecraft app). Find the world you are looking for and select SETTINGS. On the left side of your screen try to find the TAB that says BEHAVIOR PACKS. Then you will see two TABS on the main screen. ACTIVE PACKS and MY PACKS. Your behaviour pack should be in the tab MY PACKS, which you should click



and select activate. If you are not sure what pack you need, go look at the ACTIVE PACKS and one of those should say that "This pack is missing". Find the Pack with the same name on the MY PACKS tab and activate it.

PROBLEM: The world has boards that have weird text, say something like the board. Act.1. NPCs have weird dialogue. ETC

SOLUTION: That means that the RESOURCE PACK didn't load appropriately with the world. Exit the world (but not the Minecraft app). Find the world you are looking for and select SETTINGS. On the left side of your screen try to find the TAB that says RESOURCE PACKS. Then you will see two TABS on the main screen. ACTIVE PACKS and MY PACKS. Your behaviour pack should be in the tab MY PACKS, which you should click and select activate. If you are not sure what pack you need, go look at the ACTIVE PACKS and one of those should say that "This pack is missing". Find the Pack with the same name on the MY PACKS tab and activate it.

\*Check if you are facing both of these problems, go to both of these solutions\*

PROBLEM: The world is in a different language.

SOLUTION: The COSMICON worlds are translated into different languages. Maybe you have a world that is in a different language than yours. Find the appropriate language and start again. If this doesn't work, set the language of the Minecraft app according to your preference through the SETTINGS. In the English version select the English US option, not the UK.

### Minecraft's Game Environment

**World**: The place where students go to build and can save their work as a file that shows up in My Worlds.

**Inventory:** The pop-up menu that a student uses to select and manage items carried in their hotbar.

Library: Where all classroom build challenges and lessons are located within the Minecraft Education game or on the website.



**Starter Worlds**: Blank templates to help get started creating lessons in Minecraft Education. Biomes, specifically, are regions distinguished by unique geographical features, plants, and animals.

**Build Challenges**: Worlds in the in-game library that have specific prompts and objectives to build a solution to the prompt.

Figure 11: Minecraft items



Block: The basic unit of structure in Minecraft.



**Movement:** a game mechanic that allows the player to travel from one Block to another. Students use their mouse or trackpad to move their player's head and the W, S, A and D keys to move forward or backwards.



Mine: Destroying a block.





Place: Adding a block. Blocks are placed wherever your cursor is pointed at in the world.



Skin: A texture that is placed on an avatar that allows players to customize the game.



**Lesson planner:** In-game library lesson plans as well as the Lesson Planner document can be used to plan lessons.

Source: Minecraft

### Minecraft first lesson or demo

### Build a House Challenge - suggested for age range 9-12 years +

This first lesson demonstrates how to use Minecraft to move and build a house. Students can think of what kind of house they would create, if they could build anything! They will explore all of the different **blocks** (materials to build with) and use at least two to build the house. At the end, they can submit a screenshot of the build showing mastery of the house build task.

The first step is open the world to practice how to move and build.



In the program, go to Play, and then select View Library, find How to Play, select Additional Tutorials, and open the Build a Simple House Challenge world. You can explore the different kinds of worlds available and how to use them in the classroom.

Minecraft Build Challenges start by posing a challenge and inviting students to design a solution. For example, you can build a futuristic car, design a sustainable version of your school, architect an energy-efficient home, or recreate a scene from history or local landmark. Minecraft Education offers a unique learning platform where students can tackle creative build challenges in-game.

Starter Worlds can be used, which are blank slates that you can ask your students to create anything at all related to your curriculum! There's a great Blocks of Grass world which has nothing in it but grass and perfect for students' imaginations.

As well as finding worlds in the library, you can also share a link to a world directly to the students. Check out the three options currently in each lesson when you go to Share Link. You can just get a direct link or share directly via Teams or Google Classroom.

Figure 12: Minecraft Education Edition – Share link



Source: Minecraft Education Edition



In Minecraft Education, you see on screen features such as a crosshair in the center of the screen which is where actions take place from mouse button selections.

- Crosshair (+ in the center of the screen): The crosshair is moved with the mouse and is where a block will be destroyed or placed. If the word Place is not on the mouse picture, the crosshair isn't pointed to a place where building can happen.
- Hotbar (9 boxes at the bottom of the screen): The hotbar is the inventory. It 'is accessed by using the number keys (1-9) on the keyboard, or by using the rolling wheel on the mouse to scroll across the hotbar. Consider this a tool belt with all the items you can quickly access. Whichever item is highlighted, will be in the right hand on the screen.

### How to move and navigate in Minecraft Education

### Keyboard controls

Keyboard controls are along the left side of the screen while mouse controls are on the right side. Mouse controls change as the crosshair moves.

### Figure 13: Keyboard controls



Source: education.minecraft.net



### Movement with the mouse

Consider the mouse as the head and the keys of the body. If a player needs to look left, move the mouse to the left. Follow the same steps when looking right, looking down, and looking up.

Place and break with the mouse (controls on the bottom left of the screen):

The picture on the bottom left of the screen is the mouse. It shows that if you right-click, a block will be placed and if you left-click, a block is broken up.

The left mouse button is used to mine or break blocks. This is how to build. The right is to talk to characters, or to place or use whatever is in hand.

If you're using a trackpad on a laptop, the same controls apply with the trackpad controlling head/eyes and selecting the right-click vs left-click buttons.



### Figure 14: Mousse movement

Source: education.minecraft.net

Physically moving the player, use the keyboard's **W** A **S** D keys.



Figure 15: Keyboard explanations

| 11           |           | BGE     | <u>م</u>   | are f     | 8)3)3                    |          |     |
|--------------|-----------|---------|------------|-----------|--------------------------|----------|-----|
|              |           |         | For        | the       | REST                     | ot Us    |     |
| Escape       | esc       | Hotba   | r Selectio | n         |                          | FI       |     |
| Pause        | 1 2       | 3 4     | 5 6        | 7 8       | 9                        | 6        | A D |
| D            | rop - q   | N E     | T 🔶        | Chat<br>y |                          |          | R   |
| Sneak<br>Or  | shift     |         |            | Ju        | mp                       |          |     |
| FIX COMI     |           | spac    | e bar 🔸    | Do<br>Ho  | uble jump<br>ld to fly u | p to fly |     |
| http://tech. | grandmade | eb.com/ |            |           |                          |          |     |

Source: tech.grandmadeb.com

- $\mathbf{W}$  Press and hold to walk forward.
- $\boldsymbol{S}-\boldsymbol{P}ress$  and hold to walk backward.
- $\mathbf{A}-Press$  and hold to move left.
- **D** Press and hold to move right.

Jumping can be accomplished by pressing the spacebar, twice for flying.

- **E** Inventory (gathering items for building)
- C Engages Code Builder

### Shift - Sneak

Combine these keyboard buttons to zigzag, jump while moving in a direction, or move the mouse at the same time to navigate in a more natural motion.

Pressing the escape key (**Esc**) on the keyboard gives access to the game menu and computer mouse pointer to complete other tasks.

In Settings and Controls, these button options can be adjusted to the user's needs.



Additional Practice can be found in-game:

- Navigate to the View Library
- Select the How to Play library
- Select Start Here
- Select tutorial 1. Movement and 2. Place and Break.

Navigating in Minecraft Education is like real life navigation. Visually taking in surroundings while physically moving through the world.

On screen, there is navigation guidance along the left side while mouse selection options are found on the right side of the screen. As the mouse moves up, you look up, as the mouse moves down, left, and right, you look that way too.

### Minecraft Education Inventory



### Figure 16: Minecraft inventory

Source: education.minecraft.net



One of the keyboard controls is to press **E**. This opens the Inventory. To select, drag, and swap items to be used in the hotbar. Explore all the different kinds of materials there is at your disposal and begin to imagine the kinds of creations students can build.



#### Figure 17: Minecraft inventory

Source: education.minecraft.net

In order to build in Minecraft, items must be placed in the inventory. Notice where the crosshairs are, that's where blocks are placed. If placed incorrectly, it can be broken up to get rid of it. That's the heart of Minecraft.

There's no undo button or action. In Minecraft Education, students learn from making mistakes. When mistakes occur, blocks are broken and replaced to correct a mistake. This allows improvements to be made as students learn how to avoid making the same error moving forward.

Educators can first demonstrate these things using the teaching model of teach, release, reflect.



### Code Builder

#### Figure 18: Code Builder



Source: education.minecraft.net

Code builder is the more direct approach that implements coding. Like the Scratch environment, it is an easy first step for children to coding.

It takes just a few steps to set up your coding window so that you are ready to begin highlevel programming in the fast-growing and versatile programming language, Python. Minecraft Education Edition offers an engaging platform for learners to begin a Python journey.



### Figure 19: Code builder presentation



Source: tech.grandmadeb.com



Write code in the (Plus Sign) New Project area, or take a tutorial.

The coding window has example code and a workspace below.

Going back to variables, some students already understand Minecraft. They understand that there are conditions in Minecraft that change, such as the weather. Making the connection to variable use is easier because students can observe for themselves what the changing value of the variable "means" in the game. This example is written for the Notebook interface, and world. weather is the location which stores the current weather in the Minecraft Education game. In the code window, the current state of the weather can be accessed as well as changed. For example:

#### Figure 20: Minecraft variables



Source: tech.grandmadeb.com

Considering the programming concepts discussed earlier, here is how they can be applied to creating a program that builds a tower in a Minecraft Education world terrain:

1. Algorithm: The algorithm for building a tower could involve steps like selecting alocation, placing blocks in a specific sequence, and repeating the process until the desiredheightisreached.

2. **Sequence**: The instructions for placing blocks need to be in the correct order to build the tower from the bottom up. If the sequence is reversed, the tower would appear upside down.



3. Selection: Using an IF-THEN statement, you can add a condition to check if the player has enough resources to build the tower. If resources are insufficient, the program can notify the take alternative action. player or an 4. Abstraction: Instead of manually placing each block, you can use visual blocks provided by Code Builder to simplify the process. This abstraction hides the underlying code and high-level allows students to focus the logic. on 5. Decomposition: To build the tower, you can decompose the task into smaller sub-tasks such as building the base, adding floors, and placing the roof. Each sub-task can be addressed individually, making the overall process more manageable.



### **Classroom Resources for Paper**

A student checklist for learning some building basics:

### Figure 21: Checklist

| Name:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
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| Minecraft H                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | ducation Checkoff list:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <ul> <li>I can log into my ad and password</li> <li>I can go to a practice View Library &gt;Star</li> <li>I can use WASD to</li> <li>I know how to jump</li> <li>I know how to fly u</li> <li>I know how to leave</li> <li>I can re-open a word</li> <li>I can use inventory blocks like wool, at</li> <li>I can select blocks them in my hand b</li> <li>I can show and hid</li> <li>I can break a block</li> <li>I can place a blocks of from different slots</li> <li>I can place a row of</li> <li>I can make stacks of</li> <li>Challenge 1: I can representing the modeling</li> <li>Challenge 3: I can representing the modeling</li> <li>Challenge 3: I can steps high - or high</li> </ul> | <pre>count in Minecraft with a user name<br/>ce world by clicking on<br/>ther Worlds &gt;Biomes &gt;Blocks of Grass<br/>move around in Minecraft.<br/>),<br/>p, and fall back down.<br/>e Minecraft and save my world.<br/>d by choosing View my Worlds.<br/>("E"verythingtory) to search for<br/>ad put them in my hotbar.<br/>("E"verythingtory) to search for<br/>ad put them in my hotbar and put<br/>y using number keys.<br/>e the hints for controls with "H."<br/>with right click.<br/>by clicking on it.<br/>that square before I place my block.<br/>of different colors next to each other,<br/>s on my hotbar.<br/>f ten blocks in my world.<br/>blocks two and three high.<br/>the blocks two and three high.<br/>the blocks in my world.<br/>blocks two and three high.<br/>the blocks in my world.<br/>the blocks in my</pre> |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |

Source: tech.grandmadeb.com



An example teacher resource for skills based learning and self-assessment:





Source: tech.grandmadeb.com

### How to set up a Multiplayer Game

Multiplayer is one of the most popular and effective ways to leverage Minecraft in the classroom. It's a great way to encourage collaboration, communication and problem solving as students work together on projects in a shared Minecraft world.

Minecraft Education features multiplayer games that connect using picture-based join codes. All players in the same Microsoft 365 organization account can host and join worlds together in the classroom. For most users, this means the part of your email address after the @ symbol matches that of the other players.

### How to Host a World

Click Play on the home screen



### Figure 23: home screen



Source: education.minecraft.net

### Host an existing world

Choose an existing world to host from the View My Worlds collection. You can also import and launch a new world from the Library Collection. Follow the instructions in the How to host a world in-progress section to host a world that you open from the Library Collection.



### Figure 24: How to host a world





Source: education.minecraft.net

Click on a world in your My Worlds collection and then click Host.

Read the Configure settings for your Multiplayer game section to learn how to access your Join Code and change settings for your hosted world.

Create a new world to host

| On | the Play | screen, | click Create | New and | then | click New. |
|----|----------|---------|--------------|---------|------|------------|
|----|----------|---------|--------------|---------|------|------------|



### Figure 25: Game settings for hosting a new world

| NEW        |  |
|------------|--|
| TEMPLATES  |  |
| CREATE NEW |  |

| < Create New Wor     | ld                                      | Game Settings                                     |  |
|----------------------|-----------------------------------------|---------------------------------------------------|--|
|                      |                                         | World Name                                        |  |
|                      | and the second second                   | My World                                          |  |
| a contraction of the |                                         | Default Game Mode                                 |  |
|                      |                                         | Survival 👻                                        |  |
| and have             | and | Difficulty Difficulty                             |  |
| Play                 | Host                                    | Peaceful 👻                                        |  |
| Edit Settings        |                                         | Permission level for students who join your world |  |
| Game                 |                                         | 📩 🔀 Member 👂                                      |  |
| Add-Ons              |                                         | World Type                                        |  |
| Resource             | Packs                                   | Infinite 👻                                        |  |
| Babaujan P           | taaka 🗸                                 |                                                   |  |

Source: education.minecraft.net

Select the options you would like applied to your new world, and then click Host.

Read the Configure settings for your Multiplayer game section to learn how to access your

Join Code and change settings for your hosted world.

How to host a game in-progress

Pause the game and from the Friends tab click Start Hosting then click Confirm.



### Figure 26: Start hosting

| < Resu      | ume Game             |                                                                                                                                                                   |        |
|-------------|----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|
| 1 1 1 1 1 1 | START HOST<br>BryanB | START HOSTING<br>If you start hosting, we will create a code for you to<br>give to other players so they can join your world.<br>Would you like to start hosting? | BryanB |
| -           |                      | Confirm                                                                                                                                                           |        |
|             |                      | Cancel                                                                                                                                                            |        |
|             |                      |                                                                                                                                                                   | 2      |

Source: education.minecraft.net

Read the Configure settings for your Multiplayer game section to learn how to access your

Join Code and change settings for your hosted world.

How to join a world

Click Play on the Home screen and then click Join World.



Figure 27: Home library

Source: education.minecraft.net



Enter the Join Code for the world you want to join by clicking on each picture in order. If a student enters incorrect join codes repeatedly, they'll get a warning after 3 failed attempts. After 5 failed attempts, they will be required to wait a few minutes before they can enter another Join Code. This prevents students from guessing Join Codes and entering sessions they are not invited to.

| < Flay       |                 |        |
|--------------|-----------------|--------|
|              | Enter Join Code | ×      |
|              |                 |        |
| VIEW MY WORL | Clear Confirm   |        |
| CREATE NE    |                 | IMPORT |

#### Figure 28: Join code

Source: education.minecraft.net

### Different ways to assess student learning

Assessment Rubrics are helpful to ground your students in what they need to do to master a lesson.

### Example:

- Four walls and a roof, 3 points
- Use at least two different building materials, 1 point
- Submit a screenshot for assessment, 1 point



As the educator, you need to decide the aspects of learning in Minecraft Education that you want to assess. As with any good planning, the best place to start is with your learning goals. Then determine the best way to assess, which may be through discussion, writing, reflecting, administering tests, or using some of the in-game Minecraft Education tools.

Assessment is a process used by educators and students during and after instruction. Assessment provides feedback to adjust ongoing teaching/learning and improve students' achievement of intended instructional outcomes. Minecraft Education offers educators and students many opportunities to reflect on learning outcomes and make adjustments along the way that show progression of the learning. It's the perfect tool for assessment.

When you're ready to assess your students' creations in Minecraft, you'll need a way to collect what you're assessing. There are many ways to share creations and give them to you. If you have an LMS like Teams or Google Classroom, create an assignment and collect screenshots that way. One of the easiest ways to start is to simply open up a shared drive folder and invite students to upload their creations there.

You can review the screenshots in front of the class and ask students to share more about their build, or you can provide individual feedback via a grading feedback system in an LMS. Students having other students see their creations is one of the most magical parts of creativity in the classroom!

When students have submitted a screenshot, it's important to have them save their world so they can come back to put finishing touches on the house. Worlds save to the local device only; they DO NOT save to Cloud Storage. Worlds, once saved to local device, can be found again in My Worlds in your in-game menu. To save, press the Escape key, and then select Save and Exit.

Students can easily use Minecraft with a premade world with prompts and instructions, like a Lesson World.

Example student rubrics from the IPC for Computing, (Milestone 1 and Milestone 2) that would be applicable when students are learning with Minecraft:



| 1.02 Be able to give instructions                                                                               | to control or direct a device or on                                                                                                               | screen character                                                                                                   |
|-----------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------|
| MASTERING                                                                                                       | DEVELOPING                                                                                                                                        | BEGINNING                                                                                                          |
| I can:                                                                                                          | I can:                                                                                                                                            | I can:                                                                                                             |
| - Give a full set of instructions<br>to make a device or character do<br>what I want it to do                   | - Give a small set of instructions to make a specific thing happen                                                                                | <ul> <li>Give one instruction at<br/>a time to make<br/>something happen</li> </ul>                                |
| - Remember and use the right<br>words, blocks and/or symbols<br>for the device or character I am<br>instructing | <ul> <li>Use an example or a guide to<br/>help to write the instructions<br/>that can be followed</li> <li>Give instructions which use</li> </ul> | - Follow an example to<br>help me to give<br>instructions that can be<br>followed                                  |
| - Talk about how and why I wrote the instructions in this order                                                 | the right words and/or symbols<br>for the device or character I am<br>instructing including using<br>blocks of code                               | <ul> <li>Select the right words<br/>and/or symbols for the<br/>device or character I am<br/>instructing</li> </ul> |
| - Try out instructions to see if<br>there are any problems and say<br>how I might make them better              | <ul> <li>Choose the right instructions<br/>for a device/character to follow<br/>to complete a simple task</li> </ul>                              |                                                                                                                    |

| 2.02 Be able to use sequences of instruction to achieve specific outcomes                                             |                                                                                                               |                                                                                                 |  |
|-----------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|--|
| MASTERING                                                                                                             | DEVELOPING                                                                                                    | BEGINNING                                                                                       |  |
| I can:                                                                                                                | I can:                                                                                                        | I can:                                                                                          |  |
| - Give a full and correct set of<br>good instructions, in the best<br>order, so that the result is what<br>was needed | - Give more than one full set<br>of instructions, to make a<br>device or character do what I<br>want it to do | - Give a full set of<br>instructions to make a<br>device or character do<br>what it needs to do |  |
| - Say where I could group<br>instructions and use<br>loops/functions, to make them<br>better                          | – Use examples to work out<br>where I could group<br>instructions together                                    | – Use a list of the right<br>words and symbols to<br>finish instructions                        |  |
| Detter                                                                                                                | – Try out the instructions to see if there are any problems, and make them better                             | – Find any problems in<br>instructions and say how I<br>might make them better                  |  |



| – Show how different instructions can have the same result                                    |  |
|-----------------------------------------------------------------------------------------------|--|
| <ul> <li>Find and correct any problems and talk about how this changed the outcome</li> </ul> |  |



- Education.minecraft.net
- learn.microsoft.com/en-us/training/modules/minecraft-intro-game-based-learning/ for training modules and teacher academy
- Join the Minecraft Community
  - Sign in at educommunity.minecraft.net to make your free account and get your Community Badge! Here you can read support articles, post a question in the forum, meet teachers from around the world, and also file a support ticket for technical issues at aka.ms/meeticket—they get back within 24-48 hours to help you! Don't forget to also sign up for the newsletter to get announcements of new worlds, challenges, lessons, and free trainings: aka.ms/mcedunewsletter.
- Listen to Global Mentors Andy Kneuven and Natasha Rachell give their advice to success with Minecraft. https://youtu.be/ha\_YIz7NMIU
- Extra practice build a moat, watch this video: https://youtu.be/39OhzGPaX30
- Artificial Intelligence & Me' introduces & explains the 5 Big Ideas (Perception, Representation and Reasoning, Learning, Natural Interaction, and Societal Impact) in Artificial Intelligence. In this fun one-hour class, students will learn about the Five Big Ideas in AI (Perception, Representation & Reasoning, Learning, Human-AI Interaction, and Societal Impact) through discussions and games. https://outschool.com/classes/minecraft-survival-club-jungle-explorers-editionlive-the-savage-life-3LtDbsht
- See digitalrichards.com for all things Minecraft



### Annex 2: Technical Specifications

A stable internet connection is required for Minecraft to download game files, authenticate Java profile names, and connect to multiplayer servers.

Minecraft will not run on Windows RT tablets or a toaster (despite some actually using Java), or your car (feel free to prove us wrong, though).

A computer with the minimum requirements should enable gameplay for Minecraft: Java Edition. However, for the best experience, provide the recommended requirements.

Tip: If you are unsure of whether or not your computer is powerful enough to run Minecraft, it is highly recommended that you try Minecraft in demo mode before purchase.

#### Minimum requirements

CPU: Intel Core i3-3210 3.2 GHz / AMD A8-7600 APU 3.1 GHz / Apple M1 or equivalent

RAM: 2 GB

OS: Windows 7 and up or macOS: 10.14.5 Mojave and up (Minecraft: Java Edition versions later than 1.18 are no longer supported on Mac OS below version 10.14.5) \**Linux varies by OS, but for screen read functionality we require Orca 3.32 or higher* 

VIDEO CARD: Integrated: Intel HD Graphics 4000 (Ivy Bridge) or AMD Radeon R5 series (Kaveri line) with OpenGL 4.41Discrete: Nvidia GeForce 400 Series or AMD Radeon HD 7000 series with OpenGL 4.4

PIXEL SHADER: 5.0

VERTEX SHADER: 5.0

FREE DISK SPACE: At least 1 GB

#### **Recommended Requirements**

CPU: Intel Core i5-4690 3.5GHz / AMD A10-7800 APU 3.5 GHz or equivalent

RAM: 4 GB

OS: Windows 10 (and above) or macOS: 10.14.5 Mojave and up



VIDEO CARD: GeForce 700 Series or AMD Radeon Rx 200 Series (excluding integrated chipsets) with OpenGL 4.5

PIXEL SHADER: 5.0

VERTEX SHADER: 5.0

FREE DISK SPACE: 4 GB

DEDICATED VIDEO RAM: 256 MB

For desktop and laptops, you can run either version Java or Windows 10 (and above). Minecraft for Windows can be installed from the Microsoft Store. Minecraft: Java Edition can be installed from our website.

#### Software Requirements

Minecraft Release 1.6 or newer. Older versions will need to be updated to current versions.

Note that some users experience issues playing Minecraft while using a mismatched version of Java for their operating system (32 or 64 bit), while using certain versions of Java 7, or while multiple versions of Java are installed.

Java 8 is required to run Minecraft versions 1.12 through 1.17. Java 17 is required to run Minecraft version 1.18 and up. If you don't know whether you have the necessary version of Java, don't worry, our installers supply Minecraft with its own version of Java by default.

To install the game, go to the Minecraft download page and download the game client. You can download the game client even if you don't own the game, but you will only be able to play the Minecraft Demo Mode. After downloading the client, double-click the shortcut icon to run it.

Note: Minecraft purchases are tied to your account (email address) and not a device. As such, you can download and install Minecraft: Java Edition on as many computers as you want.

To log in, use your email address and password (or Java profile name and password if you have an older account). Please make sure that you are connected to the internet, because the game will automatically download additional files the first time. After you install Minecraft and store your account credentials, it's possible to play either with or without an internet connection.



Firewalls and antivirus programs can sometimes cause trouble during installation. If you're having trouble installing Minecraft, you may want to allow Minecraft through your firewall or antivirus software and try again.

If you experience issues downloading or running Minecraft, please visit our Minecraft: Java Edition Troubleshooting page.

### HOW TO MANUALLY UPDATE MINECRAFT

To play the newest content in Minecraft, your game needs to be updated to the most recent version. This should happen automatically while your device is in standby mode or in use while connected to an active Internet connection. However, if you need to manually update your game, you'll find the instructions for your Minecraft version listed below.

### HOW DO I FIND MY CURRENT VERSION NUMBER?

Find the version number on the bottom right of the Minecraft home screen.

### MINECRAFT: JAVA EDITION (PC/MAC)

Open the Minecraft launcher. The launcher should automatically show you the latest release. If not, click the arrow to the right of the Play button and select Latest Release.

Don't see the launcher? Download it.

### MINECRAFT UNIFIED LAUNCHER

As of December 2020, the Minecraft Launcher supports both Microsoft and Mojang accounts. This means you can play both Minecraft: Java Edition and Minecraft Dungeons from the same place. We hope the following answers will help you with questions you may have about these changes.

### WHAT IS THE UNIFIED MINECRAFT LAUNCHER?

In December 2020 we created a single unified Minecraft Launcher from which players can launch both Minecraft: Java Edition and Minecraft Dungeons. The banner you're seeing at the bottom of your game directs you to the link where you can install this launcher. Moving to the launcher is required and centralizes your launchers for Minecraft games.



### HOW CAN I GET THIS NEW UNIFIED LAUNCHER?

If you're already running the Minecraft Launcher, the update will download automatically when you start the program. If you currently have only the Minecraft Dungeons Launcher, you can download the new Minecraft Launcher.

### DO I HAVE TO UPGRADE TO THIS NEW LAUNCHER?

As of January 18, 2021, the new launcher is required to access Minecraft Dungeons. The old launcher will let you know that you need to upgrade.

# I OWN THE GAME ON THE MICROSOFT STORE. WHERE IS THE LAUNCHE R?

The launcher is not available for players who purchased the game from the Microsoft Store or anyone playing through Xbox Game Pass for PC. The launcher is a delivery vehicle for getting the game onto your computer. Because the Microsoft Store handles all downloading, installing, and updating, the launcher is not available there.



### Annex 3: International Survey Data graphs and Infographics

Extract of the comparative analysis of everyday practices of AI and coding in partner countries.

#### Italy

Q1.3 How familiar are you with Coding and/or AI concepts?



Q2.4 I feel game-based learning experience would ensure high engagement level among my students 15 responses





7 responses





### Greece



#### Q1.3 How familiar are you with Coding and/or AI concepts?



21 responses









### Spain



#### Q1.3 ¿Está familiarizado con los conceptos sobre codificación y/o Inteligencia Artificial?

Q2.4 Creo que una experiencia de aprendizaje basada en juegos garantizaría un alto nivel de compromiso entre mis alumnos/as. 27 responses









### Latvia



#### Q1.3 How familiar are you with Coding and/or AI concepts?

### Q2.4 I feel game-based learning experience would ensure high engagement level among my students

24 responses









### Croatia

#### Q1.3 How familiar are you with Coding and/or AI concepts?



Q2.4 I feel game-based learning experience would ensure high engagement level among my students 26 responses









### The Netherlands





Q2.4 I feel game-based learning experience would ensure high engagement level among my students

12 réponses





