Guide to teaching AI literacy, computer science, digital citizenship & cyber with Minecraft Education

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INTRODUCTION

Are you curious how you might begin computer science in your classroom? Are you looking for a unique way to engage your students into learning new skills and content? With technology playing an increasingly important role in every profession, a foundational understanding of computer science is becoming an essential component of student learning. The need for authentic and engaging computer science instruction is more important than ever.

Minecraft Education is pleased to introduce the K-12 Computer Science Progression. Within the progression, you will find a computer science content collection with over 220 hours of high-quality computer science lessons intended for all students in their educational journey.

The material has been exclusively designed to afford teachers a consistent and easy-to- implement curriculum resource. Teachers can leverage the novelty and engagement of the Minecraft worlds to help students to acquire content knowledge and develop relevant skills. By using Minecraft as a platform for learning, educators, like you, can motivate and inspire every student to achieve more and ignite a passion for learning computer science.

You don't need to be an expert Minecraft player to start teaching with Minecraft Education! In fact, Minecraft is a great place to start your computer science journey. First, make sure you have the necessary hardware and software.

Hardware	The teacher will need a laptop or tablet. Internet access will be required for a portion of the lessons and activities. Each student will need a device to complete the plugged-in coding activities. OPTIONAL: Some educators prefer students to use headphones during the independent work segment of the lessons, as there is noise within the game.
Software	Minecraft Education needs to be deployed on the devices utilized within these lessons.
Other Materials	Certain lessons will call for basic supplies such as copies of handouts, pencils, markers, etc. Each individual lesson will specify if any additional materials are needed outside of the hardware and software.

GETTING STARTED

Students

There are no required prerequisites around computer science, coding, or tech skills for students. Students should have had some instruction and/or guidance around device usage and navigation (i.e., appropriate use of hardware, device login procedure/information, digital safety, etc.). There is a recommended grade level/age range for students as it relates to the developmentally-appropriateness and reading comprehension levels of the computer science units.

Teachers

Teachers do not need to have any prior computer science experience; however, they should familiarize themselves with a basic understanding of Minecraft Education. Minecraft Education can be installed on Chromebook, PC, Mac, iPad, iPhone, and Android mobile devices. To ensure your experience with Minecraft Education is top-notch, make sure your devices meet the minimum system requirements. To check if your device supports Minecraft Education, see System Requirements.

If you have questions about setting up Minecraft Education, the following link will provide you with some frequently asked questions and additional information about set-up. On this page, you will find assistance for:

- Get Started
- Purchase Licenses
- Administration and License Management
- Installation
- Troubleshooting

Minecraft Computer Science Progression

The Minecraft CS curriculum progression is specially designed CS content to address relevant academic standards in a logical, sequential progression. Students will learn, practice, and apply relevant CS skills and concepts in both unplugged and digital experiences. The lessons are designed to follow the gradual lease methodology (refer to the Lesson Design section of this guide found below). Students should have multiple opportunities to practice and demonstrate mastery in any given skill/concept.

To provide teachers with a consistent and easy-to-follow format, the instructional materials for the Minecraft computer science pathway are standardized. All units within the entire progression will follow the same instructional methodology and include all the same resources to ensure a consistent and high-quality experience for both teachers and students.

Unit Materials

Curriculum Overview	This computer science unit document will provide you with a complete overview of the content, skills, and learning outcomes intended to be taught. It will include the theme and/or focus of the unit, the relevant grade levels or age group, connection to the Minecraft Teaching and Learning framework, essential questions, objectives, academic standards, suggest lessons and pacing, assessments, and glossary.
Educator's Guides (Lesson Plan)	The educator's guide provides an overview of the theme, learning goals, standards addressed, required preparation for the activities, key vocabulary, the lesson plans for the activities, and any additional materials needed.
Classroom Presentations	Each lesson (educator's guide) is supported by its own PowerPoint presentation to provide structure and guide the educator through the activities for the lesson. This will support the lesson delivery for students.
Formative Assessments	These assessments are intended to provide a quick check for understanding based on the concepts and skills taught during the specific lesson. Each formative assessment is 2- 4 questions and should be completed at the end of the lesson. These are found within the educator's guides.
Summative Assessment	This is a culminating experience intended to assess students' learning of all the computer science concepts taught within the unit in an authentic and meaningful way.
Minecraft World Files	These are the specific world files needed to experience the instructional activities that have been linked directly within the Educator's Guides. If there is no file listed within the lesson plan, then it is an open build. Students should use a Blocks of Grass template (or any other appropriate template) to complete the lesson.

Lesson Design

Within the Minecraft Computer Science K-12 Progression, there are various curriculum units for students. Within each unit, there are multiple lessons (which are known as the Educator's guides). All lesson activities within the Educator's Guide will contain three parts correlating with the gradual release model:

Direct Instruction— "I Do"	In the first step, the teacher models the appropriate way of performing the skills included in the new concept being taught.
Guided Instruction— "We Do"	After the teacher models the correct way to understand or perform the new concept being taught, they partner with the students and work through some examples together (partner with teacher and/or classmates).
Independent Practice— "You Do"	This step is where students demonstrate their initial level of understanding of the new concept being taught through independent practice.

EDUCATIONAL STANDARDS

This next section will provide you with an overview of the full computer science curriculum and its corresponding academic standards. The curriculum sequence is presented in chronological order—we suggest working in order within the grade level bands, as the content will build upon skills presented in the previous unit. However, educators should feel empowered to modify and adapt the content and/or sequence to best meet the needs of their students.

Grade Level	Curriculum Unit	Number of Lessons	Hours	Standards Addressed

K-2	Responsible Technology Use	6 lessons	10 hours	1A-CS-02 1A-CS-03 1A-NI-04 1A-AP-11 1A-DA-06 1A-DA-07 1A-IC-17 1A-IC-18
K-2	Storytelling in Minecraft	12 lessons	22 hours	1A-IC-17 1A-AP-12
K-2	Computing with Minecraft	16 lessons	21 hours	1A-AP-10 1A-AP-11 1A-AP-12 1A-AP-14 1A-AP-15 1A-AP-17 1A-AP-18
3-5	Coding Fundamentals (Part 1)	10 lessons	16 hours	1B-AP-08 1B-AP-10 1B-AP-11 1B-AP-15 1B-AP-17
3-5	Coding Fundamentals (Part 2)	10 lessons	16 hours	1B-AP-08 1B-AP-10 1B-AP-11 1B-AP-15 1B-AP-17
3-5	Coding Fundamentals (Part 3)	6 lessons	12 hours	1B-AP-13 1B-AP-16 1B-AP-08 1B-AP-10 1B-AP-11 1B-AP-15 1B-AP-17

3-5	Artificial Intelligence	8 lessons	13 hours	1B-IC-18 1B-IC-20 1B-AP-08 1B-AP-11 1B-AP-15 1B-AP-17
6-8	Coding with Minecraft (Part 1)	17 lessons	21 hours	2-DA-08 2-AP-10 2-AP-11 2-AP-12 2-AP-13 2-AP-14 2-AP-18 2-AP-19
6-8	Coding with Minecraft (Part 2)	21 lessons	40 hours	2-AP-17 2-DA-08 2-AP-10 2-AP-11 2-AP-12 2-AP-13 2-AP-14 2-AP-18 2-AP-19
6-8	Seymour Island	1 lesson	3 hours	2-AP-11 2-AP-12 2-AP-14
9-12	Python 101 Python Islands Python Playgrounds			3A-AP-13 3A-AP-14 3A-AP-15 3A-AP-16 3A-AP-17 3A-AP-18 3A-AP-21 3A-AP-22 3A-AP-23

CS Concepts

This next section will provide you with an overview of the full computer science curriculum and the CS concepts covered within the unit.

Grade Level	Curriculum Unit	Number of Lessons	Hours	CS Concepts Covered
K-2	Responsible Technology Use	6 lessons	10 hours	• Algorithms • Devices • Data • Computing Systems • Troubleshooting • Impacts of Computing • Social Interactions • Cybersecurity • Safety
K-2	Storytelling in Minecraft	12 lessons	22 hours	• Sequencing • Algorithms/Instructions/Commands • Digital Communication • Digital Content • Decomposition • Intellectual Property • Attribution • Collaboration • Digital Artifacts • Debugging • Collaboration • Program Development • Testing
K-2	Computing with Minecraft	16 lessons	21 hours	• Sequencing • Algorithms • Decomposition • Variables • Positions • Loops • Debugging • Collaboration • Program Development • Testing

3-5	Coding Fundamentals (Part 1)	10 lessons	16 hours	• Credibility/Accuracy of Resources • Public Domain/Creative Commons • Copyright • Intellectual Property • Decomposition • Sequencing • Control Flow (structure) • Events + Event Handlers • Algorithms • Pattern Recognition • Loops • Conditionals • Debugging • Program Development • Collaboration
3-5	Coding Fundamentals (Part 2)	10 lessons	16 hours	• Credibility/Accuracy of Resources • Public Domain/Creative Commons • Copyright • Intellectual Property • Decomposition • Sequencing • Control Flow (structure) • Events + Event Handlers • Algorithms • Pattern Recognition • Loops • Conditionals • Debugging • Program Development • Collaboration

3-5	Coding Fundamentals (Part 3)	6 lessons	12 hours	• Credibility/Accuracy of Resources • Public Domain/Creative Commons • Copyright • Intellectual Property • Decomposition • Sequencing • Control Flow (structure) • Events + Event Handlers • Algorithms • Pattern Recognition • Loops • Conditionals • Debugging • Program Development • Collaboration
3-5	Artificial Intelligence	8 lessons	13 hours	• Impacts of Computing • Feedback • Decomposition • Data • Data Visualization • Algorithms • Debugging • Program Development • Iteration • Creating Computational Artifacts • Safety | Ethical Uses of AI
6-8	Coding with Minecraft (Part 1)	17 lessons	21 hours	• Decomposition • Data Collection • Algorithms • Events • Event Handlers • Documentation • Control Flow (structure) • Loops • Variables • Conditionals • Debugging • Program Development

6-8	Coding with Minecraft (Part 2)	21 lessons	40 hours	• Decomposition • Algorithms • Control Flow (structure) • Functions • Iteration • Debugging • Arrays • Artificial Intelligence • Machine Learning • Program Development
6-8	Seymour Island	1 lesson	3 hours	• Decomposition • Sequencing • Nested Loops • Compound Conditionals • Algorithms • Debugging • Program Development • Cryptography
9-12	Python 101 Python Islands Python Playgrounds			• Python commands • Syntax structure • String (text) • Integers (numbers) • Coordinates • Positions • Variables • Lists • Zero based numbering • For loops • Nested loops • Conditionals (if | if else | elif) • Boolean logic • While loops • Functions • Decomposition • Outputs • Logic operators • Debugging • Using Reference Guide

CYBER SKILLS CURRICULUM STANDARDS GUIDE

INTRODUCTION

In today's digital age, cybersecurity is becoming increasingly important, not just for schools, businesses and governments but for individuals as well. With cyber threats becoming more sophisticated, there's an urgent need to educate our young learners about the significance of cyber safety and how to navigate the digital world securely. Minecraft Education recognizes this need and has incorporated a robust curriculum of cyber education within its K-12 Computer Science Progression. This ensures that as students journey through the world of computer science, they are also equipped with the knowledge and skills to protect themselves and their digital assets in the cyber realm.

The Cyber Skills Curriculum not only introduces students to digital citizenship and cyber ethics through critical thinking learning experiences but also to crucial topics in cybersecurity such as digital footprints, phishing, password protection, and understanding encryption, malware and ransomware. These topics are seamlessly integrated into the Minecraft environment, making it a fun and immersive experience for students.

By integrating cyber education within the computer science curriculum, we hope to prepare students for a future where digital literacy goes hand in hand with cyber awareness. After all, understanding computer science is incomplete without acknowledging the importance of cybersecurity in our interconnected digital world.

Educators, this is your opportunity to mold digitally responsible citizens. The challenges and opportunities of the cyber world await your students, and with the K-12 Cyber Education in Minecraft Education, you'll have the tools to guide them through it. Dive in, explore, and let's create a safer digital future together!

Students

There are no required prerequisites around computer science, coding, or tech skills for students. Students should have had some instruction and/or guidance around device usage and navigation (i.e., appropriate use of hardware, device login procedure/information, digital safety, etc.).

Teachers

Teachers do not need to have any prior cyber or computer science experience; however, they should familiarize themselves with a basic understanding of Minecraft Education. Support for building out teacher knowledge can be found here: Teach cybersecurity concepts with Minecraft Education - Training | Microsoft Learn Minecraft Education Cyber Teacher Academy

K-12 CYBER SKILLS CURRICULUM

The Minecraft Cyber Skills collection is specially designed cyber content to address relevant academic standards in a logical, sequential progression. Students will learn, practice, and apply relevant cyber skills and concepts in both unplugged and digital experiences. The lessons are designed to follow the gradual lease methodology (refer to the Lesson Design section of this guide found below). Students should have multiple opportunities to practice and demonstrate mastery in any given skill/concept.

K-12 CYBER STANDARDS

This next section will provide you with an overview of the full Cyber Skills curriculum and its corresponding academic standards. The curriculum sequence is presented in chronological order—we suggest working in order within the grade level bands, as the content will build upon skills presented in the previous unit.

However, educators should feel empowered to modify and adapt the content and/or sequence to best meet the needs of their students.

EDUCATIONAL STANDARDS

Grade Level	Curriculum Unit	Number of Lessons	Hours	Standards Addressed
K-5*	CyberSafe • Home Sweet Hmm • Privacy Prodigy • Good Game • AI: Dig Deeper • Cloudcraft • Bad Connection?	6 lessons	10 hours	**CTSA** 1A-IC-18 1A-IC-17 1B-NI-05
6-8	Cyber Fundamentals • Network Heroes • The Interceptors • Cloud Champions	7 lessons	5 hours	**CSTA** 2-NI-04 2-NI-06 2-NI-05 **ISTE** 1.2.b 1.2.d **CYBER.ORG** 6-8.CS.COMP 6-8.CS.COMM.1 6-8.SEC.CRYP 6-8.SEC.COMP 6-8.SEC.CIA 6-8.SEC.INFO 6-8.SEC.AUTH 6-8.SEC.NET 6-8.DC.ETH 6-8.SEC.NET 6-8.DC.FOOT.1 6-8.DC.FOOT.2 6-8.CS.IOT 6-8.CS.LOSS

9-12	Cyber Expert • Cryptic Ciphers • Daring Defense • Malware Mayhem	9 lessons	5 hours	**CTSA** 3A-NI-05 3B-NI-04 3A-NI-06 3B-NI-08 **CYBER.ORG** 9-12.SEC.CRYP 9-12.SEC.PHYS 9-12.CS.HARD 9-12.SEC.COMP 9-12.SEC.CTRL 9-12.SEC.ACC
10-12	Cyber Defense	4 lessons	1-2 hours	Exam SC-900: Microsoft Security, Compliance, and Identity Fundamentals **CSTA** 3A-NI-06 3A-NI-08 **ISTE** 1.2.b 1.2.d **CYBER.ORG** 9-12.SEC.INFO 9-12.SEC.COMP 9-12.SEC.NET 9-12.SEC.CTRL

CYBERSECURITY & CS CONCEPTS

This next section will provide you with an overview of the full computer science curriculum and the CS concepts covered within the unit.

Grade Level	Curriculum Unit	Number of Lessons	Hours	CS Concepts Addressed
K-5	CyberSafe: Home Sweet Hmm	1 lesson	1.5 hours	• Physical and digital security measures • Logging on privately • Logging off appropriately Data privacy • Passwords • Phishing • Credible Website • Online Scams • Digital citizenship • Applying safe online practices • Safe online communication Reporting concerns
K-5	CyberSafe: Privacy Prodigy	1 lesson	1.5 hours	• Physical and digital security measures • Data privacy • Digital Footprint Digital citizenship • Applying safe online practices • Safe online communication • Reporting concerns

K-5	CyberSafe: Cloudcraft	1 lesson	1.5 hours	• Collaboration tools • Personal data • Physical and digital security measures • Malware • Sustainable information systems • Social Media and Safety • Sharing data online • Understanding the internet • New ways to protect online privacy and identity • Reporting safety concerns
K-5	CyberSafe: Good Game	1 lesson	1.5 hours	• Positive online communities • Digital citizenship • Code of conduct • Digital well-being • Online safety • Responsible technology use
K-5	CyberSafe: AI: Dig Deeper	1 lesson	1.5 hours	• Digital literacy • AI ethics • Critical thinking • Data literacy • Academic integrity • Human oversight • Data privacy • Deepfakes
K-5*	CyberSafe: Bad Connection?	1 lesson	1.5 hours	• Privacy & PII protection • Manipulation recognition (social engineering) • Platform safety tools & documentation • Help-seeking & safe escalation • Respectful participation & upstander behavior • Digital footprint

6-8	Cyber Fundamentals (Part 1): Network Heroes	3 lessons	2 hours	• CIA Triad • Network Defense Strategies • Network Components and Topology Local-area network (LAN) • Wide-area network (WAN) • Data Packets • Encryption • Secure Data Transmissions • Confidentiality • Password protection • Layered security practices • Malware • Collaboration • Cyber Ethics • Persona data protection • Digital Footprint
6-8	Cyber Fundamentals (Part 2): The Interceptors	2 lessons	1.5 hours	• Physical and digital security measures • Cyber Ethics • Digital Citizenship • Digital Footprint • Personal Data Protection • Analyze threats and vulnerabilities • Authentication methods • Authorization methods • Malware • Network security layers • Multi-factor authentication • Strong passwords • Phishing • DOS/DDOS

6-8	Cyber Fundamentals (Part 3): Cloud Champions	2 lessons	1.5 hours	• Physical and digital security measures • Digital Citizenship • Ethical and malicious hacking • Digital Footprint • Personal Data Protection • Analyze threats and vulnerabilities • Internet of Things • Data Backups and Data Loss
9-12	Cyber Expert (Part 1): Cryptic Ciphers	3 lessons	1.5 hours	• Encryption and Decryption • Caesar Ciphers • Vigenère Ciphers • Message integrity • Social engineering
9-12	Cyber Expert (Part 2): Daring Defense	3 lessons	1.5 hours	• Firewalls • DoS|DDoS Attacks • Access Control Systems • Firewalls • Allow/Deny Rules
9-12	Cyber Expert (Part 3): Malware Mayhem	3 lessons	1.5 hours	• Malware: Virus, Trojan, Worm • Cyber defense strategies • Malware attacks • DOS/DDOS attacks • Backup software
10 - 12	Cyber Defender	4 lessons	1-2 hours	• Defense-in-depth • Network Security • Physical Access Controls • Malware attacks • Phishing attacks • Denial-of-service (DoS) and Distributed denial of service (DDoS) attacks • Cyber ethics • Data Privacy