

AI SCOPE AND SEQUENCE

PREK-12 CONCEPTS FOR TEACHING ABOUT AI



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Project Lead: Dr. Christopher Harris, GVBOCES

SCOPE AND SEQUENCE

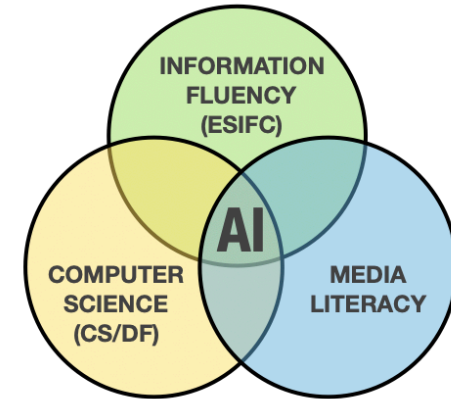
USING THIS RESOURCE TO GUIDE AI INSTRUCTION

This scope and sequence document presents grade band concepts for teaching about artificial intelligence across PreK-12. Although not a comprehensive curriculum, this document can be used as a framework to curate or create curriculum resources for teaching lessons about AI.

The LibraryReady.AI project will continue to support instruction about AI through our own curation and creation of activities involving librarians, teachers, and instructional technology leaders across New York.

This initial document lays out four major strands for building student understanding about artificial intelligence [Why AI, How AI Works, AI in Society, and AI in Practice]. These strands represent the intersection of computer science, media literacy, and information fluency and are aligned with associated New York standards.

The strands are further divided into 16 total topics. For each topic, there are concept statements that show growth of the concept across the grade bands as well as a highlighted



priority concept for each grade band as a starting point. Concepts are labeled as Strand.Topic.Grade Band using P/E/M/H for the grade bands.

Learn More: <https://libraryready.ai>

Strand 1: Why AI: The Evolution and Integration of AI into t

Reading This Document

Four Major Strands		Elementary [3-5]	Middle [6-8]	High [9-12]
1. AI in My Life	1.1.P: Students will explore everyday tools, like smart speakers and tablets, to help with tasks. Identify how AI can be used in simple activities, such as playing music or answering questions.	1.1.E: Students will investigate how AI is used in their daily lives. They will explore how AI makes these tools more customized and helpful.	1.1.M: Students will analyze how AI impacts personal lives, such as recommendations on social media or shopping websites. They will reflect on how these AI systems influence their behavior and their suggestions.	1.1.H: Students will evaluate the role of AI in personal life by assessing tools like virtual assistants, smart devices, and recommendation engines. They will analyze the impact of AI on decision-making.

16 Topics

Highlighted Priority Concepts

Concepts by Grade Band

Strand 1: Why AI: The Evolution and Integration of AI into the World and My Life

This first strand explores the history and future of artificial intelligence through the lens of the student's personal life and their view of the world around them.

Key Vocabulary: artificial intelligence, smart speaker, robot, artificial general intelligence, recommendation engine, machine learning, speculative future, virtual assistant

	Primary [PK-2]	Elementary [3-5]	Middle [6-8]	High [9-12]
1. AI in My Life	1.1.P: Students will explore everyday tools, like smart speakers and tablets, that use AI to help with tasks. They will identify how AI can assist with simple activities, such as playing music or answering questions.	1.1.E: Students will investigate how AI is used in their daily lives, such as in online searches, navigation apps, or video games. They will discuss how AI makes these tools more customized and helpful.	1.1.M: Students will analyze how AI impacts personal decisions, such as recommendations on social media or shopping websites. They will reflect on how these AI systems learn from their behavior to improve their suggestions.	1.1.H: Students will evaluate the role of AI in personal life by assessing tools like virtual assistants, smart devices, and recommendation engines. They will critically examine the potential benefits and risks of relying on AI tools for personal decision-making.
2. AI in the World	1.2.P: Students will hear stories about how AI helps people in different parts of the world, like robots helping doctors or AI tools that translate languages. They will describe how AI tools help solve problems and connect people across distances.	1.2.E: Students will describe how AI systems are used globally, from self-driving cars to environmental monitoring. They will investigate real-world examples of AI tools being used to improve communities and solve big challenges like climate change.	1.2.M: Students will research the role of AI systems in industries such as healthcare, agriculture, and transportation. They will analyze how AI tools are changing the way people work, making tasks more efficient, and improving productivity across sectors.	1.2.H: Students will evaluate the global implications of AI, exploring its role in advancing fields like renewable energy, urban planning, and global communication. They will discuss the ethical considerations of AI's influence on job markets and societal change.
3. Growth of AI	1.3.P: Students will learn about AI applications and other technological innovations over time, from simple calculators to today's advanced robots and AI tools that are capable of completing new tasks.	1.3.E: Students will investigate the history of AI, learning about key milestones such as the development of early computers and the invention of modern AI technologies. They will discuss how AI has changed over time and what future AI might look like.	1.3.M: Students will analyze the growth of AI, from early inventions to present-day applications like machine learning. They will examine the factors that have driven AI's rapid development and how these advancements are shaping the future.	1.3.H: Students will research the historical development of AI, identifying key breakthroughs and their impact on technology, society, and the economy. They will evaluate the potential for the exponential growth of the use of AI systems and the potential for new uses of AI tools.
4. Speculative Futures	1.4.P: Students will imagine how AI might help in the future by thinking about how robots or smart machines might help them in their everyday lives. They will share ideas about how AI tools might help solve problems or make tasks easier.	1.4.E: Students will discuss possible future AI technologies and innovations, such as robots that could do more complex tasks or AI systems that can think like humans. They will brainstorm how these technologies might change the way people live and work.	1.4.M: Students will explore futuristic applications of AI, including how AI systems might transform transportation, healthcare, and communication. They will analyze speculative ideas like the role of AI tools in space exploration or solving global challenges.	1.4.H: Students will critically analyze speculative futures involving AI, considering both utopian and dystopian possibilities. They will evaluate the social, ethical, and environmental implications of the potential for AI tools to transform society and solve complex issues.

Strand 2: How AI Works: Technical Aspects and Functionality of AI

In the second strand, students will explore the technical workings of AI as it relates to algorithms, machine learning, and the challenges that AI programmers face.

Key Vocabulary: decision making, algorithm, input, output, voice assistant, sorting, patterns, computer training, deterministic vs probabilistic algorithms, optimization

	Primary [PK-2]	Elementary [3-5]	Middle [6-8]	High [9-12]
1. AI Technologies	2.1.P: Students will investigate and identify different types of AI technologies by observing how different devices, apps, and other tools use AI and other types of algorithms to accomplish a wide variety of tasks.	2.1.E: Students will compare simple AI technologies and types of AI tools, like spell check and more advanced software like voice assistants. They will identify what each technology can do and how AI helps with everyday tasks.	2.1.M: Students will identify and compare different types of AI used in various fields, like healthcare and entertainment. They will describe how AI systems are designed for specific purposes and explore their advantages and limitations.	2.1.H: Students will evaluate real-world AI tools, analyzing their capabilities and limitations. They will assess how well these tools meet specific needs and discuss their potential impact on society.
2. Algorithms and AI Models	2.2.P: Students will explore the basics of creating algorithms by following simple sequences, like "First, Next, Then, Last." They will use patterns and sequences to understand how computers follow steps to complete tasks.	2.2.E: Students will describe how algorithms process inputs to create outputs. They will develop their own simple algorithms and test them, understanding how AI makes decisions based on the data it receives.	2.2.M: Students will be introduced to machine learning by learning how AI is trained with data to recognize patterns and improve its decision-making. They will explore real-world examples of how AI learns from inputs and produces outputs.	2.2.H: Students will investigate different types of algorithms, including deterministic (fixed outcomes) and probabilistic (variable outcomes). They will analyze how AI systems use these algorithms to make predictions and decisions, considering the consequences of errors or bias.
3. AI Development and Challenges	2.3.P: Students will identify the basic requirements for using AI tools, such as electricity to power the device running the AI software. They will learn that AI tools require the right inputs to solve problems and create outputs.	2.3.E: Students will discover what AI tools can and cannot do by exploring simple tasks AI tools are effective at, like sorting images, and tasks where AI tools are less effective, like understanding emotions. They will discuss why AI tools have strengths and weaknesses.	2.3.M: Students will explore the process of training AI models, including common challenges for AI tools, like inaccurate outputs resulting from poor inputs. They will determine how AI tools can be improved based on feedback about success and errors.	2.3.H: Students will investigate advanced AI concepts like optimization and bias correction. They will discuss how improving AI performance sometimes leads to unintended consequences, such as reinforcing bias, and explore ways to address these challenges.

Strand 3: AI in Society: Ethics and Other Questions About AI

The third strand covers a broad range of questions about AI including ethics issues like privacy and safety, but also concerns for the environment and our future workforce.

Key Vocabulary: preferences, translation, data privacy, environmental impact, personal data, ethical dilemma, autonomous vehicles, AI regulations

	Primary [PK-2]	Elementary [3-5]	Middle [6-8]	High [9-12]
1. Privacy Issues	3.1.P: Students will observe how some devices like phones and computers remember their preferences, such as favorite games or songs. They will recognize how AI tools use this information to help them, but also that it's important to ask before sharing personal details, like names or pictures.	3.1.E: Students will identify how AI systems, like websites and apps, collect information about what people do. They will describe how companies use this data to make suggestions, and compare this to concepts around personal privacy.	3.1.M: Students will analyze how AI tools collect data from people's online activities, like search history, social media, gaming and other online activities. They will identify concerns about privacy, including who owns this data and how it might be used by companies or governments.	3.1.H: Students will critically evaluate issues surrounding data privacy, including the ethics of collecting personal data without consent and the implications of AI-based surveillance. They will analyze legal and ethical frameworks that aim to protect individual privacy in an increasingly data-driven world.
2. Safety Issues	3.2.P: Students will describe how AI tools like virtual assistants and robots help people stay safe, such as by calling for help or turning off lights. They will identify what AI tools need to work properly to keep people safe and that adults help make sure they are used correctly.	3.2.E: Students will identify how AI systems, like self-driving cars or security cameras, help keep people safe by making quick decisions. They will also discuss the importance of making sure these systems don't make mistakes that could cause harm.	3.2.M: Students will investigate the safety challenges associated with AI, such as the risks of malfunctioning AI systems in critical areas like transportation or healthcare. They will consider how AI developers test these systems to minimize errors and ensure they are safe for public use.	3.2.H: Students will investigate ethical dilemmas related to AI safety, such as whether AI systems can be trusted in life-or-death situations like autonomous vehicles or medical diagnosis. They will debate the responsibility of AI creators and governments in regulating these technologies to prevent harm.
3. Information Issues	3.3.P: Students will investigate how AI tools can be used to find information, like answers to questions or facts about animals. They will discuss that sometimes, AI tools might generate incorrect answers, and it's important to ask an adult if something seems wrong.	3.3.E: Students will describe how AI systems—similar to search engines—provide information, but also that these systems can sometimes make mistakes or show incorrect results. They will discuss why it's important to check information from different sources.	3.3.M: Students will analyze the role of AI tools in the creation and spreading of information and misinformation online, including how AI systems rank content and the risks of false or biased information. They will explore how algorithms shape the news and content they see on social media.	3.3.H: Students will critically assess the role of AI systems in information dissemination, including its role in amplifying misinformation, deepfakes, and biased content. They will discuss ethical questions about who controls the flow of information and how AI tools can be used to combat or exacerbate these issues.

Strand 3: AI in Society: Ethics and Other Questions About AI (Continued)

The third strand covers a broad range of questions about AI including ethics issues like privacy and safety, but also concerns for the environment and our future workforce.

Key Vocabulary: preferences, translation, data privacy, environmental impact, personal data, ethical dilemma, autonomous vehicles, AI regulations

	Primary [PK-2]	Elementary [3-5]	Middle [6-8]	High [9-12]
4. Cultural and Global Impacts	3.4.P: Students will explore stories about how AI tools help people around the world, like translating languages or helping farmers. They will describe how AI systems can make life easier for many people, but that it is also important to think about everyone when building AI tools.	3.4.E: Students will observe how AI tools help people in different cultures, such as by making travel easier or connecting people who speak different languages. They will also discuss how some countries have more access to AI tools than others, and how that can affect people's lives. Students will also be introduced to the idea that AI systems use a lot of energy and that can affect the environment.	3.4.M: Students will analyze the global impacts of AI, exploring how it changes industries, cultures, and economies. They will investigate how AI technologies can benefit or disadvantage different regions, particularly in terms of access to technology and economic opportunity. Additionally, students will explore how AI tool usage contributes to environmental concerns, like energy consumption and its effect on climate change.	3.4.H: Students will critically examine the cultural, global, and environmental impacts of AI, considering its role in reinforcing cultural biases, its unequal distribution across countries, and its potential to either promote or hinder global equity. They will also evaluate the environmental footprint of AI systems, including the energy required for large-scale data centers and the ecological consequences of widespread AI tool deployment. Ethical questions about balancing technological advancement with environmental sustainability will also be explored.
5. Workforce Impacts	3.5.P: Students will identify how AI helps some people do their jobs, like helping doctors or teachers with their work. They will discuss how AI tools can make jobs easier but that it's still important for people to do many tasks themselves.	3.5.E: Students will describe how AI can help workers by taking over repetitive tasks, such as in factories or offices. They will also discuss how this could mean some people's jobs might change in the future, and how learning new skills is important.	3.5.M: Students will analyze how AI is changing the job market, automating tasks in industries like manufacturing, healthcare, and transportation. They will explore how AI tools might create new job opportunities while also reducing the need for certain types of work.	3.5.H: Students will critically assess the broader impact of AI tools on the workforce, including the potential for mass job displacement in certain sectors and the rise of new AI-driven career paths. They will discuss ethical considerations regarding who benefits and who may be left behind as AI systems reshape the future of work.

Strand 4: AI in Practice: Being a Productive and Responsible User

The final strand covers student use of AI as a tool for creativity and productivity including evaluation of tools and accessibility issues.

Key Vocabulary: chatbot, accessibility, inclusivity, queries, prompts, plagiarism, algorithmic bias, filter bubbles, AI agent

	Primary [PK-2]	Elementary [3-5]	Middle [6-8]	High [9-12]
1. Accessibility and Inclusivity	4.1.P: Students will investigate how AI tools can help people with different needs, such as reading text aloud or translating languages. They will discuss the importance of equitable global access to AI tools.	4.1.E: Students will investigate how AI helps make technology more accessible for people with disabilities, such as voice assistants or screen readers for people who can't see. They will also learn about the challenges some people face when AI tools don't work well for them or aren't available in their language.	4.1.M: Students will analyze how AI can both help and hinder accessibility. They will examine how AI tools are designed to support users with different needs but may also exclude people, especially when AI only works in certain languages or is not available in less-developed regions.	4.1.H: Students will critically assess the role of AI in promoting inclusivity and accessibility. They will identify issues such as English language dominance in AI tools, the digital divide in technology access, and the ethical responsibility of developers to create AI systems that work for everyone, including marginalized and disabled communities.
2. Critical Engagement with AI Tools	4.2.P: Students will identify how AI tools, like chatbots or virtual assistants, help answer questions. They will discuss why they should always ask a teacher or adult if the answer seems strange as not all AI answers are correct.	4.2.E: Students will demonstrate how to use AI tools responsibly. They will describe how AI tools can help them find information, and that it is important to check the facts by looking at other sources and asking critical questions about the information.	4.2.M: Students will demonstrate using AI tools critically by questioning the results of AI searches and recommendations. They will identify how AI tools can introduce bias or mistakes, and why human oversight (HiTL - Human-in-the-Loop) is necessary to ensure accuracy.	4.2.H: Students will engage in critical analysis of AI tools, exploring how algorithmic bias and hidden influences can shape the information and recommendations provided by AI systems. They will discuss the importance of constant scrutiny of AI system outputs and the role of human judgment in using AI tools responsibly.
3. Information Seeking Practices	4.3.P: Students will model how to ask questions to AI tools, like voice assistants, to find answers to simple questions. They will discuss why it's important to ask for help from a teacher if they can't find the right answer or if an answer seems wrong.	4.3.E: Students will identify how to search for information using AI tools, like search engines or virtual assistants. They will describe the importance of checking different sources to make sure they are getting accurate information and discuss how AI may not always provide the best answers.	4.3.M: Students will practice more advanced information-seeking practices using AI, such as refining search queries and evaluating sources. They will discuss the importance of distinguishing between reliable and unreliable sources, and how AI tools can sometimes promote popular content over accurate content.	4.3.H: Students will critically engage with AI-powered information-seeking tools, exploring the influence of search algorithms on the information they encounter. They will examine issues like plagiarism, filter bubbles, and the ethical use of AI systems in academic research, discussing the importance of diverse and critical information sources.
4. Creation and Production with AI	4.4.P: Students will use simple AI tools to help them create things, like using voice inputs to make a drawing or describing a story framework to an AI tool. They will discuss how AI can help them be creative, but that they still need to do some things on their own.	4.4.E: Students will implement use of AI tools to create new projects, like writing stories or making art. They will discuss the importance of giving credit when they use ideas or creations from others, and how copying someone else's work without asking is wrong.	4.4.M: Students will use AI tools to support more complex creative projects, like generating ideas for videos, music, or stories. They will discuss the importance of originality and ethical issues like plagiarism when using AI-generated content, and how to use AI responsibly in their own work.	4.4.H: Students will adapt their work process to include AI tools as appropriate to enhance their creative work, engage in tasks, or develop AI agents. They will critically evaluate the ethical implications of AI-generated content, considering issues like copyright, intellectual property, and the role of human creativity in the age of AI-generated production.

The LibraryReady.AI Project considers artificial intelligence in schools from three perspectives: computer science, information fluency, and media literacy. This addresses the impact AI is having on our society as a whole as well as what it means for our individual information seeking and computing practices.

Getting Started with AI Instruction

The best way to get started teaching about artificial intelligence is to first learn about the technology. Become comfortable as a user of AI before you try and teach about it. For help getting started with AI, consider taking the asynchronous professional learning course available on the LibraryReady.AI website with access through your School Library System.

When you feel ready, consider beginning with conversations around

the highlighted priority concepts for each grade band. These priority concepts have been selected to provide a strong introduction to AI within each grade band. Again, if you need help, reach out to your school librarian for additional resources or implementation ideas.

This is an ongoing effort, and new resources will be launched as part of the LibraryReady.AI project as we continue to curate and create tools.

<https://libraryready.ai>

LibraryReady.AI Advisory Team

Project Lead	Christopher Harris
SLS Director	Betsy Hartnett
SLS Director	Leanne Ellis
SLS Director	Eileen Anderson
Elementary Librarian	Michelle Robinson
Middle School Librarian	Lindsay Cesari
High School Librarian	Cynthia Sandler
CSTA NY Rep.	David Czechowski
Model Schools Rep.	Rachel Atkins
AI Advisor from Cornell	Natalie Barzarova
AI Advisor from Cornell	Qian Yang

For more information:

Dr. Christopher Harris, School Library System
Genesee Valley BOCES | cgharris@gvboces.org