

Day 1.

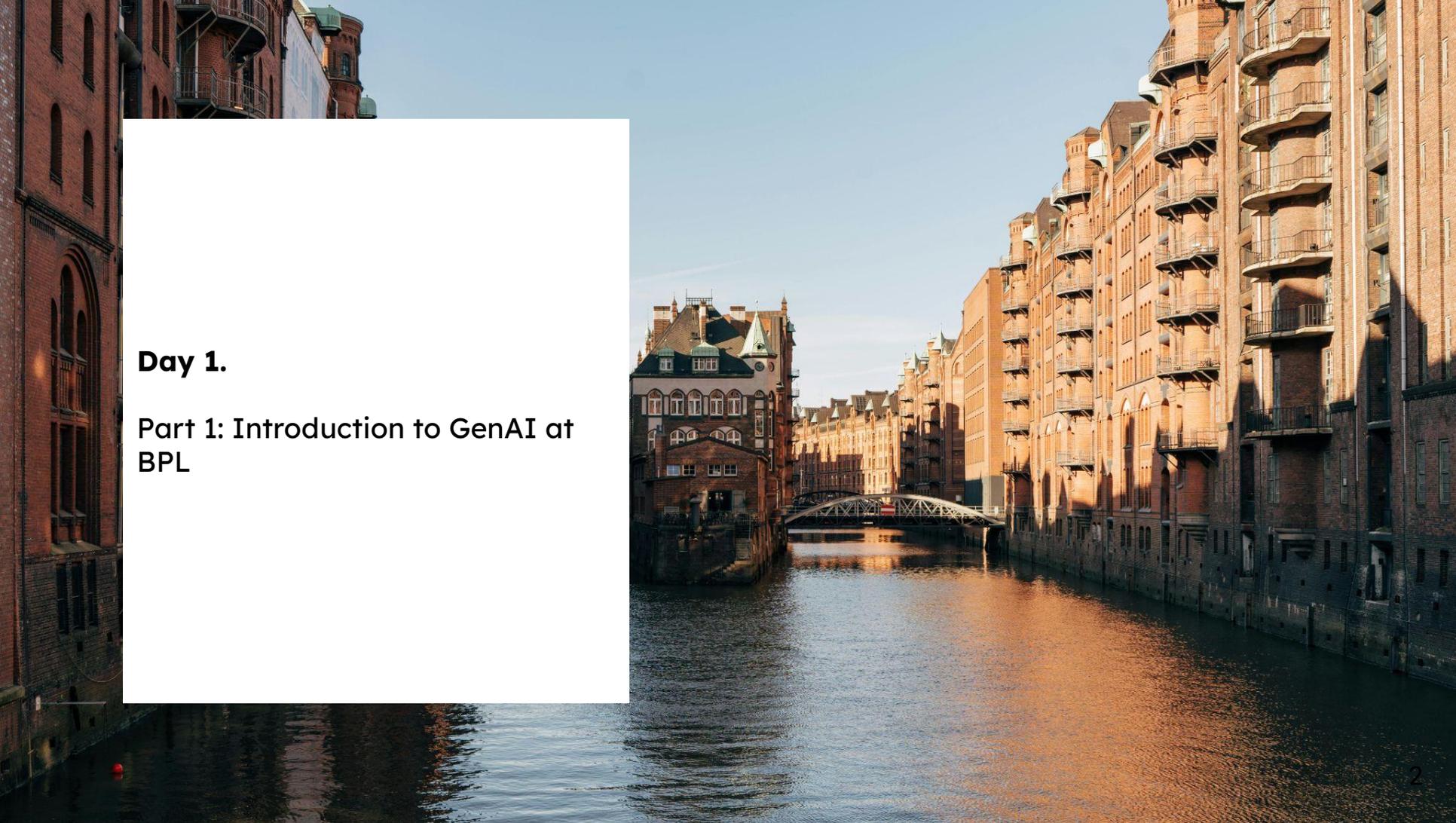
The Building Blocks: Foundations of GenAI

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The Building Blocks

Foundations of Generative AI (GenAI)

- Part 1: Introduction to GenAI and AI Fluency
 - Competencies of AI Literacy (AI Fluency - the 4Ds)
 - Evolution of Library AI Awareness - Levels of Mount AI
- Part 2: Large Language Models
 - Popular Tools: ChatGPT, Claude, Gemini
 - Best Practices
- Part 3: GenAI at Burlington Public Library (BPL)
 - Use-Cases for Different Users
 - Advanced Use-Cases at BPL
- **Discussion Topics:** GenAI in Practice
 - GenAI for Economic Growth
 - Safety & Limitations of GenAI
- Summary

A scenic view of a canal in Copenhagen, Denmark, with historic brick buildings and a bridge in the distance. The water reflects the warm light of the sun, and the buildings are multi-storied with many windows and balconies.

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1.1 Welcome to the World of GenAI: What is Generative AI (GenAI)?

Generative Artificial Intelligence or GenAI represents a significant evolution in the field of AI.

[[Unlike traditional AI systems that primarily focus on analyzing existing data to make predictions, classify information, or perform specific, predefined tasks, **GenAI can create entirely new content.** This generated content can take many forms: text, images, audio, video, software code, podcasts, animations, and even simulations or product designs.]]

What's the different between AI or traditional automation we are used to versus GenAI

Think of GenAI as your creative partner, learning underlying patterns from vast data and then using that knowledge to produce novel artifacts that resemble, but do not simply repeat, the data it was trained on.

While the creative potential of GenAI is vast and exciting, it's crucial to understand its operational basis. **GenAI systems generate outputs based on learned statistical patterns, not through genuine understanding, reasoning, or consciousness in the human sense.**

Because GenAI technology and its outputs are impressive and powerful, **GenAI requires careful, critical and responsible use and evaluation** – a core skill of AI literacy we hope to teach you and that libraries are uniquely positioned to foster in our community.

- *Anthropic calls this the Diligence competency of AI Fluency.*

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1.2 Meet the Large Language Models (LLMs) - Your New Best Friend

Within the broader category of GenAI, a specific and highly influential type is the Large Language Model, or LLM. LLMs are the engines that drive the GenAI tools you know and love, including ChatGPT by OpenAI, Google's Gemini, and Anthropic's Claude.⁶ **LLMs are specialized forms of GenAI designed specifically to process, understand, and generate human-like text.** They are trained on immense datasets comprising text and code, enabling them to perform a wide array of language-based tasks, including writing, summarizing, translating, and answering questions in a conversational manner.

Recognizing LLMs as the sophisticated engines behind text-based GenAI helps frame how we interact with them. **We don't merely "use" these tools passively; rather, we actively "prompt" and guide them to generate the desired output.** This interaction is less like using a simple appliance. Instead, it requires developing a skill of **prompt engineering**, requiring thoughtful communication, clear instructions, and **iterative refinement** to achieve high-quality results.

(AI Fluency says this involves 2 competencies (1) - Delegation - Understand how to decide what AI does and what you do; (2) Description - How to actively interact with the AI tool (prompt engineering. You can also add the competency of Discernment - How to judge what is useful, and what is not)

Understanding this dynamic is key to leveraging LLMs effectively and responsibly in your library work. **The good news: it's easy to learn!** And as with everything in life, practice makes perfect.

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1.3 How Does GenAI Work? A Peek Under the Hood

Learning from Data: The Power and Pitfalls of Patterns

LLMs work because of their rigorous “training” process. This involves exposure to massive datasets containing text and code scraped from vast swathes of the internet, digitized books, articles, websites, and other sources, potentially encompassing billions or even trillions of words. **During this “pre-training” phase, the model isn’t explicitly taught rules of grammar or factual knowledge in the way a human learns. Instead, it analyzes the data to identify statistical patterns and relationships.** It learns which words tend to appear together, how sentences are typically structured, the connections between different concepts, and even nuances of style and tone, all by calculating probabilities based on the input data.

This **reliance on patterns** learned from training data **is both the LLM’s power and its potential weaknesses.** The model internalizes the linguistic structures and knowledge present in the data, allowing it to generate coherent and contextually relevant text. However, **LLMs inevitably absorbs the biases, inaccuracies, misinformation, and dominant perspectives embedded within that same data.**¹⁸ **This direct link between training data and output characteristics makes critical evaluation of LLM-generated content not just advisable, but essential – a crucial point for librarians dedicated to information integrity.**

4D framework of AI Fluency calls this the discernment and diligence competencies.

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1.4 Predicting What's Next: The Core Mechanism

At its heart, an LLM operates as an incredibly sophisticated prediction engine – **think of LLMs as a giant “auto-complete” engine.**⁵ When provided with an input prompt (a sequence of words or text), the LLM’s core task is to predict the next most likely word, or “token” (which can be a whole word or part of one), to follow that sequence.⁵ **It calculates these predictions based on the complex statistical patterns learned during its training.**²⁹ This is why the larger the training dataset, the better the LLM. The generation process is iterative: the model predicts a token, adds it to the sequence, and then uses this new, slightly longer sequence to predict the subsequent token, continuing this process until the response is complete.

This probabilistic approach enables LLMs to generate text that is often fluent, coherent, and contextually appropriate. However, it can also explain why their outputs are not guaranteed to be factually accurate. **Because LLMs select words based on statistical likelihood derived from its training data, its output is not based on accessing or verifying real-world facts. This can lead to instances where the LLM generates plausible-sounding but incorrect information, a phenomenon often referred to as “hallucination”.** Understanding this predictive, pattern-matching mechanism helps demystify the technology; LLMs are not “thinking” or “knowing” but rather calculating probabilities.

Note: Review AI Fluency notes on critical limitations of LLMs so that there is a clear framework for folks to apply

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1.5 What Can GenAI Do? Core Capabilities

Large Language Models, powered by their sophisticated text prediction capabilities, exhibit remarkable versatility and can be applied to a wide range of tasks. Their core functionalities include:

- **Generating Text:** This is perhaps the most well-known capability. LLMs can create original written content in various styles and formats, including emails, reports, articles, blog posts, marketing copy, social media updates, and creative pieces like poems, stories, or scripts
- **Summarizing Information:** LLMs can effectively condense large volumes of text, such as lengthy articles, research papers, emails, webpages, or reports, into concise and coherent summaries, highlighting key points. We will discuss this more when we discuss Google's Notebook LM tool.
- **Answering Questions:** They can respond to a wide array of questions, from factual queries (**though verification is crucial**) to requests for explanations of complex topics. They are also useful tools for brainstorming ideas or exploring different perspectives on an issue.
- **Translating Languages:** LLMs demonstrate strong capabilities in translating text between numerous languages, often achieving high levels of fluency and accuracy.¹¹

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1.5 What Can GenAI Do? Core Capabilities (cont'd)

- **Coding Assistance:** Many LLMs are proficient in understanding and generating computer code across various programming languages. They can assist with writing new code snippets, debugging existing code, explaining code logic, translating code between languages, and even generating documentation.
- **Other Creative and Analytical Applications:** Beyond text, the underlying principles of generative AI extend to creating images (like DALL-E or Midjourney), music, and other media. LLMs themselves can also power sophisticated chatbots for dialogue generation and assist with tasks like data analysis and classification.

These diverse capabilities map directly onto many tasks performed within a library setting. However, it is important to remember that the *effectiveness* of an LLM for any specific task depends heavily on the model chosen, the quality of the prompt provided, and the critical evaluation applied to the output. This wide range of functionalities sets the stage for exploring specific library use cases and the best practices required to leverage these tools successfully.

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1.6 GenAI in the Library Landscape: How can BPL leverage GenAI?

While the prospect of large-scale, custom AI implementations might seem daunting, scary or resource-intensive for many public libraries, readily available GenAI tools offer significant and immediate potential to enhance library services and streamline operations.

The key lies in identifying realistic, valuable applications that align with library missions and capabilities, drawing inspiration from how libraries globally are beginning to explore this technology.

The Goal: Replace rote tasks with automated systems, improving efficiency, allowing you to focus on value-added and life-giving tasks.

Enhancing Information Discovery & Research Support:

- **Assisting with Complex Queries:** LLMs can serve as helpful starting points for patrons (and staff) exploring complex topics, offering explanations, definitions, and brainstorming potential research angles or keywords.¹⁷ This aligns well with tasks rated as more ethically acceptable in librarian surveys, such as using LLMs to help learn about a topic.⁶⁰

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- **Summarization:** Generating concise summaries of lengthy articles, reports, or research papers can save significant time for both patrons needing a quick overview and librarians evaluating resources. Lay summaries of academic work are a specific useful application.
- **Drafting Research Aids:** While requiring rigorous verification, LLMs could potentially generate initial drafts of literature reviews or annotated bibliographies, providing a scaffold for users to build upon.

Streamlining Library Operations:

- **Internal Communications and Documentation:** Drafting emails, memos, meeting minutes, internal reports, or initial versions of policy documents can free up staff time for other tasks.
- **Metadata and Cataloging Support:** LLMs can generate draft descriptive metadata for library materials, which librarians can then review, edit, and approve, potentially speeding up the cataloging workflow.
- **Program and Service Development:** Brainstorming ideas for library programs, workshops, displays, reading lists, or community outreach initiatives is a strong use case for GenAI's creative capabilities.

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- **Marketing and Outreach:** Creating initial drafts of social media posts, newsletter articles, website copy, or promotional materials tailored to specific audiences can enhance the library's communication efforts.

Innovating Patron Services:

- **Enhanced Chatbots:** While requiring careful implementation, monitoring, and transparency, LLMs could potentially power more sophisticated chatbots to handle basic directional, policy, or FAQ-type questions outside of staff hours. Users must be clearly informed they are interacting with AI.
- **Creative Tools:** Generating creative writing prompts, story starters, or code examples for use in library workshops or makerspaces.

Promoting AI Literacy:

- **Education and Training:** A crucial emerging role for libraries is educating the community about GenAI. This involves developing workshops, pathfinders, or guides for patrons on how to use these tools effectively, critically, and ethically.
- **Library as a Resource:** Positioning the library as a reliable resource for understanding AI's impact on information access, credibility, and society, helping patrons navigate the complexities of this new information landscape. We hope to develop BPL into this exact resource!

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1.7 BPL can use AI to transform in these areas:

Enhancing Information Discovery & Research Support

- Assisting with Complex Queries
- Summarization
- Drafting Research Aids

Streamlining Library Operations

- Internal Communications and Documentation
- Metadata and Cataloging Support
- Program and Service Development
Marketing and Outreach

Innovating Patron Services

- Enhanced Chatbots
- Creative Tools

Promoting AI Literacy

- Education and Training
- Library as a Resource

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2.1 LLM Fundamentals

The Building Blocks: Neural Networks & Transformers

To appreciate how LLMs like ChatGPT, Gemini, and Claude function, it helps to understand a little about their underlying architecture. **These models are built using complex systems called artificial neural networks.** Inspired by the structure of the human brain, these networks consist of interconnected layers of nodes (or "neurons") that process information in parallel.

A pivotal development in LLM architecture was the introduction of the "transformer" model. Transformers revolutionized natural language processing due to a key mechanism called "self-attention". This mechanism allows the model to weigh the importance of different words within an input sequence relative to each other. Unlike older models that processed text sequentially, **transformers can consider the entire context of a sentence or passage simultaneously, enabling a much deeper understanding of relationships between words, context, and nuance.** This ability to effectively process long-range dependencies in text is a major reason why modern LLMs can generate such coherent and contextually relevant language.

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Training the Giants: Data, Parameters, and Learning

The "Large" in Large Language Model **refers** primarily to **two things: the immense size of the datasets they are trained on, and (2) the vast number of "parameters" they contain.** As mentioned, training involves feeding the model massive amounts of text and code. Parameters are essentially the internal variables, or weights and biases within the neural network, that the model adjusts during the training process. These parameters, which can number in the billions or even trillions for the largest models, encode the patterns, grammatical rules, semantic relationships, and knowledge learned from the training data.

The training process typically involves several stages:

1. **Pre-training:** The model undergoes **unsupervised or self-supervised learning on the enormous, general dataset.** It learns fundamental language structures, facts about the world, and reasoning abilities primarily by predicting the next word in a sequence.
2. **Fine-tuning:** After pre-training, the model is often **further trained on smaller, more specific datasets or using particular techniques to specialize its capabilities or align its behavior with desired outcomes.** This can involve supervised fine-tuning (SFT), where the model learns from high-quality examples of specific tasks, or methods like Reinforcement Learning from Human Feedback (RLHF). RLHF uses human preferences to rate different model outputs, training the model to generate responses that humans find more helpful, honest, and harmless.¹⁵

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This multi-stage training process, especially the **fine-tuning phase, significantly shapes the model's final characteristics – its personality, conversational style, safety guardrails, and inherent biases.** It explains why different LLMs, even if built on similar architectures, can exhibit distinct behaviors.

For example, models like Claude, which are explicitly fine-tuned using methods focused on ethical principles (“Constitutional AI”), often display a more cautious and safety-oriented approach compared to others.

Understanding the role of training and fine-tuning highlights that differences between models reflect deliberate design and training choices, not just variations in raw processing power.

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2.2 Meet the Tools: ChatGPT, Gemini, and Claude

Why These Three?

This handbook focuses on ChatGPT (from OpenAI), Gemini (from Google), and Claude (from Anthropic) because they represent some of the most prominent, powerful, and widely accessible general-purpose LLMs currently available.

Librarians are likely to encounter these tools through patron inquiries, professional development, or direct use in your workflows. Understanding their distinct characteristics is crucial for effective application and guidance. However, they both produce similar results, differentiated mainly by their “fine-tuning” as discussed earlier.

Comparing the Titans: Strengths and Weaknesses

While all three LLMs share core capabilities like text generation, summarization, and question answering, they possess unique strengths, weaknesses, and design philosophies shaped by their respective developers and training processes. **It is essential to recognize that the field is evolving extremely rapidly; capabilities and performance benchmarks change frequently.** What is true today, may completely change tomorrow. That said, the following comparison provides a snapshot based on recent information, highlighting key differentiators relevant to library use.

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ChatGPT (OpenAI):

Strengths:

- **Versatility across a wide range of tasks.** It typically excels in generating creative text formats, engaging in natural-sounding conversations, and providing coding assistance.
- **Large user base** has led to extensive real-world testing and refinement.
 - Features like the GPT Store (allowing users to create and share specialized versions of ChatGPT for specific tasks) and numerous plugin integrations (though evolving) offer significant extensibility for paid users.
- Performs well in general knowledge and reasoning tasks.

Weaknesses:

- **Hallucination:** ChatGPT has sometimes been prone to "hallucinations" or generating factually incorrect information, although improvements are ongoing.
- **Verbose & Dry Writing Style:** which can be dry or academic or pedantic.
 - While context windows have increased, Claude has often maintained an edge in handling extremely long inputs.
- **Pay:** Access to the most powerful versions and features requires a paid subscription.

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Spotlight: ChatGPT

- **Interface Overview:** The main interaction happens in the central chat window. On the left, a sidebar typically shows your recent conversation history, access to custom GPTs (if applicable), and settings. You type your prompts into the input bar at the bottom. Above the input bar, you can often select the specific model (e.g., GPT-4o, GPT-3.5). Responses appear in the chat window, and below each response, you'll find options to copy the text, regenerate the response, give feedback (like/dislike), share, or sometimes edit it. Mobile apps offer similar functionality but adapted for smaller screens.
- **Key Features/Functionalities:**
 - **Custom Instructions:** Allows you to provide persistent guidance on how ChatGPT should respond (e.g., tone, perspective, formatting rules).
 - **Memory:** Enables ChatGPT to remember information across different chat sessions.
 - **GPTs (Paid Tiers):** Access to specialized GPTs created by OpenAI and the community, or the ability to create your own.
 - **File Upload & Data Analysis:** Ability to upload files (documents, spreadsheets, images) and ask ChatGPT to analyze data, create charts, etc.
 - **Web Browsing (Paid Tiers):** Can access current information from the internet via Bing search.
 - **Voice Mode:** Allows for spoken conversations with the AI.
 - **Image Generation (GPT-4o):** Can create images based on text descriptions.
 - **Canvas:** An interactive workspace for developing ideas, code, or documents.
 - **Projects:** Organizes chats and files related to a specific task.
- **Tips for Librarians:** Use Custom Instructions to define a helpful "library assistant" persona. Leverage data analysis for simple library statistics or survey results. Use it for drafting program outlines, social media posts, or email responses.

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Gemini (Google):

Strengths:

- **Multimodal:** This means its able to seamlessly process and reason across text, images, audio, and even video inputs.
- **Integration with the Google ecosystem** (Search, Workspace apps like Docs and Gmail, Maps, YouTube via Extensions) provides powerful contextual advantages and workflow efficiencies for users embedded in Google's services.
- **Access to real-time information** via Google Search is a significant benefit for current event queries.
- **Writing Style:** Gemini's writing style tends to be more colloquial versus ChatGPT's more "elevated" style.

Weaknesses:

- **Writing Style:** Some users find Gemini's conversational style less natural or engaging compared to ChatGPT.
 - Generated content can sometimes feel more surface-level. Full functionality often requires a personal Google account.

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Spotlight: Gemini

- **Interface Overview:** Accessed primarily via gemini.google.com. Features a central chat window with a prompt input bar at the bottom that accepts text, images, or files. You can select different Gemini models (e.g., Flash, Pro) via a dropdown. Below each response, options include like/dislike, redo response, share, copy, listen to the response aloud, and crucially, the "Google it" button for fact-checking attempts. Integration with Chrome allows starting chats via "@gemini" in the address bar. Mobile apps are also available.
- **Key Features/Functionalities:**
 - **Multimodal Input:** Can understand and process text, images, audio, and analyze video content.
 - **Image Generation:** Can create images based on text prompts.
 - **Extensions:** Integrates directly with Google Workspace apps (Gmail, Docs, Drive), Google Maps, YouTube, Flights, Hotels, and more, allowing it to pull information and perform actions within those services.
 - **"Google it" Fact-Checking:** Provides links to Google Search results that may support or contradict statements in the response.
 - **Deep Research:** An advanced feature to generate comprehensive reports on complex topics.
 - **Code Execution:** Can generate and run Python code.
 - **Canvas:** An interactive space for co-creating documents and code.
 - **Audio Overview:** Transforms documents into podcast-style audio discussions.
 - **Gems:** Customizable personas or expert roles for Gemini.
- **Tips for Librarians:** Use Extensions to quickly summarize emails in Gmail or find specific documents in Google Drive. Upload images of event flyers or book covers for description or analysis. Use the "Google it" button as a first step in verifying information. Explore Deep Research for generating background information on program topics.

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Claude (Anthropic)

Strengths:

- **Safety & Privacy Focused:** Claude is explicitly designed with a strong emphasis on safety, ethics, and reliability, guided by Anthropic's "Constitutional AI" approach to minimize harmful, biased, or unethical outputs.
- **Large context window:** Making it exceptionally well-suited for tasks involving long documents, extensive conversations, or complex instructions requiring sustained context.
- **Nuanced & "Natural":** Claude often excels at nuanced analysis and producing creative writing that sounds more natural and expressive.
- **Document Analysis:** It generally demonstrates high accuracy and lower rates of hallucination, particularly when dealing with information contained within provided documents.

Weaknesses:

- **Overly Cautious:** Its strong safety focus can sometimes lead it to be overly cautious, occasionally refusing to answer prompts that may seem benign to the user.
- **Model Capability:** While capable, its raw performance on certain benchmarks might slightly lag behind the top models from OpenAI or Google in specific areas, although this varies by task and model version.

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Spotlight: Claude

- **Interface Overview:** Known for its clean, minimalist web interface at claude.ai. Features a prompt input bar that accepts text and file uploads (including images, PDFs, text documents). Responses appear in the main window. Interaction options are straightforward. Anthropic also emphasizes API access for developers building custom applications.
- **Key Features/Functionalities:**
 - **Large Context Window:** A key differentiator, allowing Claude to process and maintain context over extremely long inputs (e.g., hundreds of pages of text).
 - **Safety & Ethics Focus:** Designed with strong guardrails against generating harmful, biased, or unethical content ("Constitutional AI").
 - **Vision/Image Analysis:** Can analyze uploaded images, charts, diagrams, and photos.
 - **Code Generation & Analysis:** Strong capabilities in generating, explaining, and debugging code, particularly within complex codebases.
 - **Tool Use (Function Calling):** Allows developers to integrate Claude with external tools and APIs for more complex workflows.
 - **Multilingual Processing:** Strong performance in understanding and translating various languages.
- **Tips for Librarians:** The go-to choice for summarizing or analyzing very long documents, reports, or even entire books uploaded as files. Useful for tasks where reliability and ethical considerations are paramount. It's more natural writing style can be beneficial for drafting communications or creative content.

Spotlight on Claude

The "New chat" button allows you to start a fresh conversation with Claude. Each new chat maintains its own context and history.

The Projects section helps you organize related conversations into folders. Perfect for keeping work on specific initiatives separate and easily accessible.

This shows all your individual conversations with Claude. You can quickly return to previous chats to continue where you left off or reference earlier information.

This is where you type your prompts and questions for Claude. The text field expands as you type and supports both short queries and longer, more detailed instructions.

The Recents section displays your most recently accessed chats for quick reference, making it easy to jump back into conversations you were working on.

✧ Evening, Phil

How can I help you today?



Claude 3.7 Sonnet ▾



This button submits your prompt to Claude. You can also press Enter on your keyboard to send your message, or Shift+Enter to add a new line without sending.

Spotlight on Claude

This points to the actual artifact Claude has created—in this case, a well-formatted document about "Artifacts at Boston Public Library." Artifacts are standalone documents that can be viewed, updated, and downloaded, making them perfect for creating training materials, guides, and resources for library staff and patrons.

Artifact Demonstration for BPL Library

Can you create an artifact for me. I want to showcase how it works to BPL library

I'd be happy to create an artifact to help you showcase this feature to the Boston Public Library. Let me create something educational and visually appealing that demonstrates how artifacts work.

Artifact Showcase for Boston Public Library Document

I've created a markdown artifact that showcases how this feature works! The artifact includes information specifically tailored for the Boston Public Library, explaining what artifacts are and how they could be used in a library context.

You can now:

1. View the artifact in its formatted state
2. Ask me to modify specific parts of it
3. Request different types of artifacts (such as code, visualizations, or diagrams)
4. Download it for sharing with colleagues at BPL

Would you like me to demonstrate how to update this artifact, or would you prefer to see a different type of artifact that might be useful for library presentations?

Claude can make mistakes. Please double-check responses.

Reply to Claude...

Claude 3.7 Sonnet

Artifacts at Boston Public Library

A Digital Presentation Tool

Welcome to this demonstration of Claude's artifact feature! This showcase is designed specifically for the Boston Public Library to highlight how digital artifacts can enhance your educational programs and patron services.

What Are Artifacts?

Artifacts are standalone, formatted documents that can be:

- Created during a conversation
- Updated and refined collaboratively
- Downloaded for later use
- Shared with library patrons and staff

Potential Library Applications

1. Educational Resources

- Create reading lists by genre, age group, or theme
- Develop instructional guides for library resources
- Design program outlines for book clubs or workshops

2. Library Services

- Generate step-by-step tutorials for accessing digital collections
- Create informative one-pagers about special collections
- Develop visually organized schedules for library events

3. Staff Resources

- Design training materials
- Create documentation templates

This highlighted text shows Claude's follow-up question. Claude often ends responses with questions to facilitate ongoing conversation and help refine what you need. This demonstrates Claude's ability to maintain conversational flow.

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Library Task/Consideration	ChatGPT (OpenAI)	Gemini (Google)	Claude (Anthropic)
Summarizing Long Documents	Good, context window improving	Good, context window improving	Excellent, very large context window
Answering Complex Reference Qs	Very Good, versatile reasoning	Very Good, leverages Google Search	Good, strong analysis, may be cautious
Drafting Creative Content (Programs)	Excellent, highly versatile	Good, improving capabilities	Excellent, natural/expressive style
Generating Ideas/Brainstorming	Excellent, broad knowledge base	Excellent, leverages Search for current ideas	Very Good, strong reasoning
Coding Assistance (e.g., Website)	Excellent, widely used	Very Good, integrates web tools	Excellent, strong on complex code

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Library Task/Consideration	ChatGPT (OpenAI)	Gemini (Google)	Claude (Anthropic)
Ease of Use for Beginners	Good intuitive interface	Very Good, familiar Google interface	Very Good, clean interface
Multimodal Input (Image/Audio)	Yes (Image input/gen via DALL-E, Voice)	Excellent (Native text, image, audio, video)	Yes (Image input)
Integration with Other Tools	Good (GPTs, Plugins - evolving)	Excellent (Google Workspace, Extensions)	Good (API focus, Tool Use/Functions)
Handling Citations/Sources	Can provide, but needs verification	Can provide, uses "Google it" check	Generally strong on citing from provided docs
Ethical Guardrails/Safety Focus	Moderate, improving	Moderate, improving	High, core design principle

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Pick the right model for you!

Ultimately, there is no single "best" LLM. The optimal choice is highly dependent on the specific task at hand. A librarian needing to summarize a 150-page report might favor Claude for its large context window. Someone needing to analyze data and create charts integrated with Google Sheets might turn to Gemini. A user looking to brainstorm creative taglines for a library program might find ChatGPT's versatility appealing. Understanding these nuances allows you to select the most appropriate tool for your specific needs, **keeping in mind that capabilities are constantly shifting in this dynamic field.**

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2.3 Best Practices for Working with LLMs

Simply having access to powerful LLMs like ChatGPT, Gemini, and Claude is not enough to guarantee useful results. Interacting effectively with these tools is a skill that requires practice and a strategic approach. Two core components of this skill are **prompt engineering** (crafting effective inputs) and **critical evaluation** (assessing the outputs).

We discuss prompt engineering on Day 2. A preview is included in Day 2.

Evaluating LLM Outputs: A Critical Eye

Because (1) LLMs generate text based on patterns rather than true understanding, and (2) their training data can contain errors and biases, critically evaluating their output is non-negotiable. Librarians, with your expertise in information literacy, are well-equipped to perform and teach this crucial step.

Key evaluation points include:

- **Check for Accuracy (Fact-Checking):** LLMs "hallucinate" – confidently present incorrect or fabricated information as fact.
 - **Always** verify any factual claims, statistics, dates, or other critical information using reliable, independent sources before using or sharing the LLM's output.

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- **Assess Relevance and Coherence:** Does the response directly answer the prompt? Does it stay on topic? Is the information presented logically and does the text flow well? Sometimes responses can drift or misunderstand the core request.
- **Identify Bias:** Be vigilant for biases that may stem from the training data. Look for stereotypes, unfair generalizations, skewed perspectives, or the omission of marginalized viewpoints. Consider if the output presents a balanced view when appropriate.
- **Review Sources (If Provided):** If the LLM cites sources (which is not always standard behavior), scrutinize them. Are the citations correctly formatted? Do the sources actually exist? Do they genuinely support the statements attributed to them?
- **Consider Data Cut-Off:** Remember that most LLMs are trained on data up to a certain point in time. Be aware of this data cut-off point.
 - Unless the tool has live web-browsing capabilities enabled, its knowledge of recent events or developments will be limited or non-existent.

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Applying these critical evaluation steps is fundamental to using LLMs responsibly and effectively, ensuring that the generated content meets standards of accuracy, fairness, and relevance.

Understanding Limitations: What LLMs Can't (and Shouldn't) Do

To use LLMs wisely and manage expectations (both for staff and patrons), it's vital to understand their inherent limitations:

- **Lack True Understanding/Consciousness:** LLMs excel at manipulating language patterns but do not possess genuine comprehension, consciousness, feelings, or beliefs. Their responses are sophisticated mimicry based on data.
- **No Real-World Experience or Embodied Common Sense:** Their knowledge is derived solely from their training data; they lack lived experience and the intuitive common sense humans gain from interacting with the physical world.
- **Cannot Guarantee Factual Accuracy:** As discussed, their probabilistic nature means they can generate plausible but false information. They are not reliable databases.
- **Struggle with Complex Abstract Reasoning/Advanced Math:** While rapidly improving, highly complex, multi-step reasoning or advanced mathematics can still pose challenges compared to specialized tools or human experts.

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- **Ethical Judgment is Learned/Programmed:** LLMs do not have inherent morals. Their ethical behavior is a result of explicit training, fine-tuning (like RLHF or Constitutional AI), and safety filters implemented by their creators. These guardrails can be imperfect or bypassed.
- **Not a Substitute for Professional Advice:** LLMs should never be relied upon as a substitute for qualified advice from professionals like doctors, lawyers, or financial advisors. Their outputs may be general, inaccurate, or inappropriate for specific individual circumstances.
- **Require Human Oversight for Critical Decisions:** Due to their potential for error and lack of true judgment, LLMs should not be used to make critical decisions autonomously. Human review and oversight are essential.

Acknowledging these limitations is crucial for responsible deployment and for setting realistic expectations about what these tools can achieve. It reinforces the irreplaceable value of human critical thinking, expertise, and ethical judgment.

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Ethical Use in the Library Context

Applying LLMs within a library setting requires an additional layer of consideration grounded in professional library ethics. While Day 3 of the training will delve deeper into responsible AI use, key ethical touchstones to keep in mind from the outset include:

- **Transparency:** Be open about when and how AI tools are being used, both internally and in patron-facing services. Clearly label AI-generated content or interactions.
- **Privacy and Confidentiality:** Be extremely cautious about inputting personally identifiable information (of patrons or staff) or sensitive institutional data into public LLM tools, as this data could potentially be used for model training or be exposed. Understand the data usage policies of any tool being used.
- **Intellectual Property and Copyright:** Be aware of the ongoing legal and ethical debates surrounding the use of copyrighted materials in LLM training data. Consider the implications for the ownership and use of AI-generated content.
- **Bias Mitigation:** Actively look for and attempt to mitigate biases in AI outputs. Strive to use tools in ways that promote equity and access, aligning with core library values.

Navigating these ethical dimensions thoughtfully is paramount for ensuring that the adoption of GenAI aligns with the library's mission and values.