ARTIFICIAL INTELLIGENCE FOR EDUCATION

Unleash the power of generative AI: build better software solutions, faster

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Generate incredible outcomes

The adoption of artificial intelligence (AI) is growing in education thanks to the availability of scalable compute capacity, exponential growth of student data, and the rapid advancements in machine learning (ML) technologies.

And now generative AI is changing the data landscape even faster, helping institutions be more effective and efficient.

Generative AI represents a new frontier in AI, enabling the creation of fresh content across multiple domains. The possibilities are limitless — enhanced access to and engagement with lifelong learning experiences and hyper personalization; efficiencies for communications, compliance, and back office administration; and augmenting research capabilities.

The power of foundation models—and why you don’t need to create your own

At the heart of generative AI are the foundation models (FMs), large-scale models with billions of parameters that have been pre-trained on vast amounts of data. These highly capable FMs can be tailored to perform domain-specific tasks, making them invaluable for institutions seeking to differentiate themselves in competitive markets. By leveraging a fraction of the data and compute resources required to build, train, and deploy a model from scratch, institutions can customize FMs that embody their unique voice, style, and services. This level of customization empowers higher education and research institutes to provide personalized and exceptional student and faculty experiences - without having to invest vast sums developing their own FMs. For instance, an institution that wants to auto-generate student reports can train a pre-existing FM on past reports and other relevant proprietary data, to create a fine-tuned model capable of generating more student reports from scratch (at considerably less cost than creating a new FM).

AI in Education Market size is predicted to reach USD 30 billion by 2032

Global Market Insights inc.[1]

Responsible use of AI for education

AI can help address some of the greatest challenges in education for both educators and learners. However, there are still many concerns around developing and responsibly implementing these tools, and how AI may remove the valuable human interaction. According to UNESCO's global survey of over 450 schools and universities, they found that "fewer than 10% have developed institutional policies and/or formal guidance concerning the use of generative AI applications."[2] Responsible use of these transformational technologies is key to continued innovation and Amazon Web Services (AWS) is assisting institutions with **resources and tools** to guide your development and application of AI and ML technologies.

The role of education technology companies

Many education technology (EdTech) companies are helping schools and universities overcome the hurdles of building AI by removing the complexity of the technology. By embracing AWS's cloud-based **EdTech solutions**, teachers can provide personalized learning, an automated grading system, predictive analysis, and enhance operational efficiency.

Choose the most cost-effective cloud for generative AI

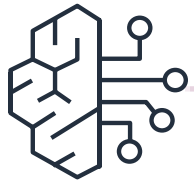
For more than 25 years, AWS has harnessed AI to deliver personalized student experiences by customizing learning content, improving guidance and intervention, and increasing student and faculty support. AWS has helped EdTechs and institutions of all sizes harness this transformative technology from secondary and primary institutions to higher education and research institutes — including **Lancaster University** (UK), **Portand State University** (USA), and **Udemy** (USA).

AWS extends this democratizing approach to generative AI: taking the tech out of the realm of research and development, and extending its availability beyond a handful of startups and large, well-funded tech companies. With generative AI on AWS, you can define how to create entirely new and original student experiences, drive unprecedented levels of productivity for your staff, and transform your institution.

AWS provides an ever-evolving suite of products and services to enable educational institutions to harness the full power of generative AI. You can choose from a range of popular FMs, or use AWS services that have generative AI built in, all running on the most cost-effective cloud infrastructure for generative AI.

aws

The easiest place to build applications with foundation models



Amazon Bedrock is the easiest way for customers to build and scale generative AI-based applications using FMs, democratizing access for all builders. Amazon Bedrock makes FMs from Amazon and leading AI startups including AI21 Labs, Anthropic, Cohere, and Stability AI accessible via an API.

Democratizing access to high-performing FMs

Organizations often seek high-performing FMs that deliver exceptional results tailored to their specific needs. Amazon Bedrock eliminates the complexities of managing large infrastructure clusters and incurring substantial costs. By providing seamless integration with applications, Amazon Bedrock empowers users to effortlessly build and scale generative AI applications without compromising on performance.

Securely building differentiated applications with proprietary data

With Amazon Bedrock, organizations can easily build customized applications using their own data while keeping their data secure and private. Amazon Bedrock allows users to securely build upon base FMs and by securely leveraging proprietary data, users can create differentiated applications that meet their unique requirements.

Effortless integration and deployment

Amazon Bedrock simplifies the model selection process with a serverless experience that provides scalability and agility while eliminating infrastructure management tasks. Users can easily find the perfect model for their needs and quickly get started. Amazon Bedrock enables customers to privately customize FMs with their own data and seamlessly integrate and deploy them into their applications using familiar AWS tools and capabilities. Users can leverage Amazon SageMaker ML features like Experiments for testing different models and pipelines for managing FMs at scale, all without the need to manage any infrastructure.

Cutting-edge FMs at your fingertips

Amazon Bedrock offers access to some of the most cutting-edge FMs available today. For instance, customers can utilize the Jurassic-2 family of multilingual large language models (LLMs) from AI21 Labs, capable of generating text in Spanish, French, German, Portuguese, Italian, and Dutch-based on natural language instructions. Additionally, Anthropic's latest LLM, Claude 2, excels in thoughtful dialogue, content creation, complex reasoning, creativity, and coding, based on Constitutional AI and harmlessness training. Cohere's Command text generation model is trained for practical business applications and its Embed model is trained for search, clustering, or classification tasks across 100+ languages. Stability AI's text-to-image foundation models, including the highly popular Stable Diffusion, enable the generation of unique, realistic, high-quality images, art, logos, and designs.

Customization made simple

One of Amazon Bedrock's most remarkable features is its ease of customization. None of the customer's data is used to train the original base models. Customers can configure their Amazon Virtual Private Cloud (Amazon VPC) settings to access Amazon Bedrock APIs and provide model fine-tuning data in a secure manner and all data is encrypted. Customer data is always encrypted in transit (TLS1.2) and at rest through service managed keys.

How education is responding to AI worldwide

Singapore is focused on becoming a world leader in AI by 2030, helping teachers better personalize and enrich the student experience[3].

South Korea aims to have AI coursework in its national curriculum by 2025[3].

The United Kingdom adopts new principles for Universities such as adapting teaching and assessment to embrace the ethical use of generative AI, ensure integrity, and continue to collaborate and share best practices as technology evolves.[4]

Learn how Vocareum enabled learners to leverage real GPUs with set cost controls in a new hands-on "**Generative AI with large language models**" course from DeepLearning.ai and AWS on Coursera.

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Empower developers to new levels of productivity

There are many ways AWS helps you take advantage of the advances in generative AI. One of those ways is by infusing generative AI with services that help accelerate and simplify daily tasks. For example, Amazon CodeWhisperer is a game-changing AI coding companion that is revolutionizing developer productivity.

Transforming the developer experience with generative AI

Before Amazon CodeWhisperer, software developers spent a significant amount of time writing code. With CodeWhisperer, developers can now rely on AI-generated code suggestions in their Integrated Development Environment (IDE). By turning over more of the writing of code to CodeWhisperer, developers can work faster and unleash their creativity. Organizations describe CodeWhisperer as demonstrating the potential to be one of the most powerful applications of generative AI, revolutionizing developer productivity.

The AI coding companion with built-in security scanning

Developers' productivity isn't truly enhanced if the code suggested by generative AI tools contains hidden security vulnerabilities or fails to handle open source responsibly. CodeWhisperer also has built-in security scanning, powered by automated reasoning. It identifies and suggests remediations for hard-to-detect vulnerabilities, including those listed in the top ten Open Worldwide Application Security Project (OWASP) and crypto library best practices. CodeWhisperer also filters out biased or unfair code suggestions and can flag code resembling open-source code for organizations' reference or licensing.

Best coding companion for working with AWS

In addition to learning from the billions of lines of publicly available code, CodeWhisperer has been trained on Amazon code. We believe CodeWhisperer is now the most accurate, fastest, and secure way to generate code for AWS services, including Amazon Elastic Compute Cloud (Amazon EC2), AWS Lambda, and Amazon Simple Storage Service (Amazon S3).

CodeWhisperer seamlessly integrates with popular IDEs like VS Code, IntelliJ IDEA, AWS Cloud9, and more through the AWS Toolkit IDE extensions.

CodeWhisperer is available in 15 languages including Python, Java, JavaScript and many more.

Free tier for individual developers

To ensure CodeWhisperer is accessible to as many developers as possible, AWS offers a free tier for individual users. There are no qualifications or time limits for generating code; anyone can sign up with just an email account. No AWS account is required. For business users, we offer the CodeWhisperer Professional Tier, which includes administration features like single sign-on (SSO) with AWS Identity and Access Management (IAM) integration and higher limits on security scanning.

Enhance your code security today

- Free for individual use
- Unlimited code suggestions
- Reference tracking
- 50 security scans (per use, per month)

Learn more ›

CodeWhisperer increases Accenture's developer productivity by up to 30%

"Accenture is using Amazon CodeWhisperer to accelerate coding as part of our software engineering best practices initiative in our Velocity platform [...] After searching for multiple options, we came across Amazon CodeWhisperer to **reduce our development efforts by up to 30%** and we are now focusing more on improving security, quality, and performance."

Balakrishnan Viswanathan, Senior Manager, Tech Architecture at Accenture

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Build, train, and deploy machine learning (ML) models for any use case

Amazon SageMaker is built on AWS's two decades of experience developing real-world ML applications, including education content recommendations, personalization of learning, and predicting student performance to provide timely support. The unique service offers a broad set of ML capabilities used by tens of thousands of organizations to access and analyze data, and build, train, and deploy high-quality ML models.

With SageMaker, you can:

- Enable more people to innovate with ML through a choice of tools—integrated development environment (IDE) for data scientists and no-code interface for business analysts.
- Access, label, and process large amounts of structured data (tabular data) and unstructured data (photo, video, geospatial, and audio) for ML.
- Reduce training time from hours to minutes with optimized infrastructure. Boost team productivity up to 10 times with purpose-built tools.
- Automate and standardize MLOps practices and governance across your organization to support transparency and auditability.
- Amazon SageMaker JumpStart is an ML hub that provides access to algorithms, models, and ML solutions, so you can quickly get started with ML. With SageMaker JumpStart, ML practitioners can choose from a broad selection of publicly available foundation models. ML practitioners can deploy FMs to dedicated SageMaker instances from a network isolated environment and customize models using SageMaker for model training and deployment.

10x
increase in team productivity

1 trillion+
predictions per month

54%
lower total cost of ownership

Up to 50%
faster training through more efficient use of GPUs

40%
reduction in labeling costs

22
compliance programs (PCI, HIPAA, SOC 1/2/3, FedRAMP, ISO, and more)

<10ms
inference overhead latency

Amazon SageMaker Studio Lab helps educators focus on teaching rather than technology.

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SageMaker for business analysts

- Easily prepare data, train models, and generate predictions using a point-and-click interface
- Improve collaboration by sharing models and datasets with data scientists
- AutoML integrated into common BI tools such as Domo, Snowflake, and Amazon Redshift

SageMaker for data scientists

- Access data from structured and unstructured data sources
- Improve productivity with purpose-built tools
- Use fully managed Jupyter Notebooks with just a few clicks

SageMaker for MLOps

- Create repeatable training workflows to accelerate model development
- Catalog ML artifacts centrally for model reproducibility and governance
- Integrate ML workflows with CI/CD pipelines for faster time to production
- Continuously monitor data and models in production to maintain quality

Watch: Use Amazon SageMaker to Build Generative AI Applications - AWS Virtual Workshop

Technology Innovation Institute trains the state-of-the-art Falcon LLM 40B foundation model on Amazon SageMaker

The United Arab Emirate's Technology Innovation Institute (TII) is a leading research center working on transformative technologies. Using Amazon SageMaker, TII was able to pre-process and train data for its open-source Falcon models. Both models (Falcon-40B and Falcon-7B) are available through SageMaker JumpStart.

Read full story ›

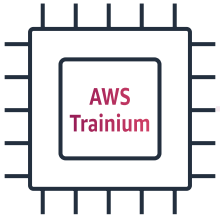
University of Oxford Introduces a Sector-Leading Image Recognition ML Prototype to Augment Digitization in Numismatics

The University of Oxford houses 21 million objects in the collections of its Gardens, Libraries & Museums (GLAM)—One of their missions is to preserve these assets and make them accessible to the world for education and research. However, the organization has only enough space to display about 10 percent of its holdings at a time. AWS helped build an enhanced image recognition system that helped accelerate the process of cataloging artifacts and expects to save up to three years of work cataloging a collection of 300,000 coins.

Read full story ›

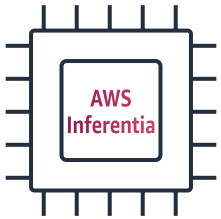
Train and run models with more power—and reduced costs

Generative AI requires extensive processing power. AWS has invested significantly in developing its own silicon to push the boundaries of performance and price performance in demanding workloads. AWS Trainium and AWS Inferentia chips provide the most cost-effective solutions for training models and running inference in the cloud.



Access unparalleled training performance with Trn1 instances

Amazon EC2 Trn1 instances, powered by AWS Trainium, introduce key innovations in ML training. These instances can deliver up to 50 percent cost savings compared to other EC2 instances, offering an exceptional value proposition. With optimization for distributed training across multiple servers connected via second-generation Elastic Fabric Adapter (EFA) networking at 800 Gbps, Trn1 instances enable accelerated training workflows. Customers such as Helixon, Money Forward, and the Amazon Search team have significantly reduced training times for large-scale deep learning models, turning months of training into weeks or even days. Building upon this success, AWS introduces the general availability of Trn1n instances, which feature 1600 Gbps of network bandwidth, enabling 20 percent higher performance for network-intensive models.



Power large-scale generative AI applications with Inf2 instances

Amazon EC2 Inf2 instances powered by AWS Inferentia2 are designed specifically for large-scale generative AI applications, featuring models with hundred of billions of parameters. They offer up to 4 times higher throughput and up to 10 times lower latency compared to the previous generation. With ultra-high-speed connectivity between accelerators, Inf2 instances facilitate distributed inference at scale. These advancements result in up to 40 percent better inference price performance compared to other EC2 instances, offering the lowest cost for inference in the cloud. Users are already experiencing up to 2 times higher throughput with Inf2 instances, enabling them to introduce more features and complex models while delivering a superior experience to millions of creators.

Ready to put that incredible power to good use?

Exploring generative AI use cases for education

The potential of generative AI is vast, with AWS tools and services at your disposal. Here are some use cases for education:

Educators & students

Hyper personalization

Generate custom lesson plans, course content, schedules, and recommendations based on individual students.

Content curation

Promote efficient studying for students by generating summaries of lengthy textbooks, research papers, lecture notes, and videos.

Generate quizzes and assessments on the most relevant topics or condense educational materials into summaries for classroom presentations.

Administrators

Automate administrative processes

Create efficiencies, enhance accuracy, and reduce points of friction for students, staff, and more by leveraging AI to classify and extract key data from documents such as transcripts, financial aid forms, compliance documents and more.

Enhance access with Dynamic Q&A

Leverage generative AI while protecting institutional data to unlock critical information from your website, knowledge base, libraries, and more. Generative AI Q and A bots remove barriers to access, enhance efficiencies, and provide highly accurate focus on your institutional information with conversational responses. Understand concepts and answer questions

Why build with AWS?

Our suite of dedicated generative AI tools and services offers the most comprehensive, performant, and scalable infrastructure for cost-effective ML training and inference. Education institutions that choose AWS for generative AI benefit from:

aws

The easiest place to build with FMs

Quickly integrate and deploy FMs into your applications and workloads running on AWS using familiar controls and integrations with the depth and breadth of AWS capabilities and services such as SageMaker and Amazon S3.

The most price performance infrastructure for ML

Get the best price performance for generative AI with infrastructure powered by AWS-designed ML chips and NVIDIA GPUs. Cost-effectively scale infrastructure to train and run FMs containing hundreds of billions of parameters.

Flexibility to build from scratch

Choose from a wide selection of FMs from AI21 Labs, Anthropic, Cohere, and Stability AI to find the right model for your use case.

Generative AI-powered solutions

With generative AI built in, services such as CodeWhisperer, an AI coding companion, can help you improve productivity. In addition, you can deploy common generative AI use cases such as call summarization and question answering using AWS sample solutions that combine AWS AI services with leading FMs.

Secure customization

Customize FMs for your organization with just a few labeled examples. Since all data is encrypted and does not leave your Amazon VPC, you can trust that your data will remain private and confidential.

Build tomorrow better with AWS

AWS provides an integrated suite of services to build and deploy generative AI applications leveraging LLMs and FMs. Amazon SageMaker helps developers train, tune, and optimize LLMs, while Amazon Bedrock offers a control plane to manage and monitor models. With Amazon CodeWhisperer, coders can bypass time-consuming coding tasks and accelerate building with unfamiliar APIs

With its end-to-end capabilities, AWS enables rapid development of accurate, robust generative AI applications for any organization.

Learn more about Machine Learning for Education ›
Learn more about generative AI on AWS ›
Learn more about AWS Cloud Computing for Education ›
Learn more about AWS Cloud for EdTech ›

[1] "AI in Education Market size is predicted to reach USD 30 billion by 2032," Global Market Insights, February 2023
[2] "Less than 10% of schools and universities have formal guidance on AI," UNESCO, August 2023
[3] "Shockwave & Innovations: How Nations Worldwide Are Dealing with AI in Education" The74Media August 2023
[4] "New principles on use of AI in education" Russell Group, July 2023