

# An Introduction to Modern Adaptive Learning Systems

Nordic ADL  
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Dr. Jennifer Solberg  
Quantum Improvements Consulting



QUANTUM IMPROVEMENTS  
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# Introductions

- Founder and CEO of a small business in Orlando, FL, USA
- Ph.D. in Cognitive and Experimental Psychology
- Nearly 20 years researching technology for training and performance improvement



# What is adaptive learning?

Adaptive learning technology provides a tailored learning experience to an individual or group based on information about them. Usually, this is based on their knowledge, skill levels, or competency.

You can adapt:

- Content (e.g., matching difficulty level to performance)
- Feedback (e.g., scaffolding)
- Assessments (e.g., harder questions after correct responses)
- Delivery (e.g., timing, format)



# Why should I consider it?

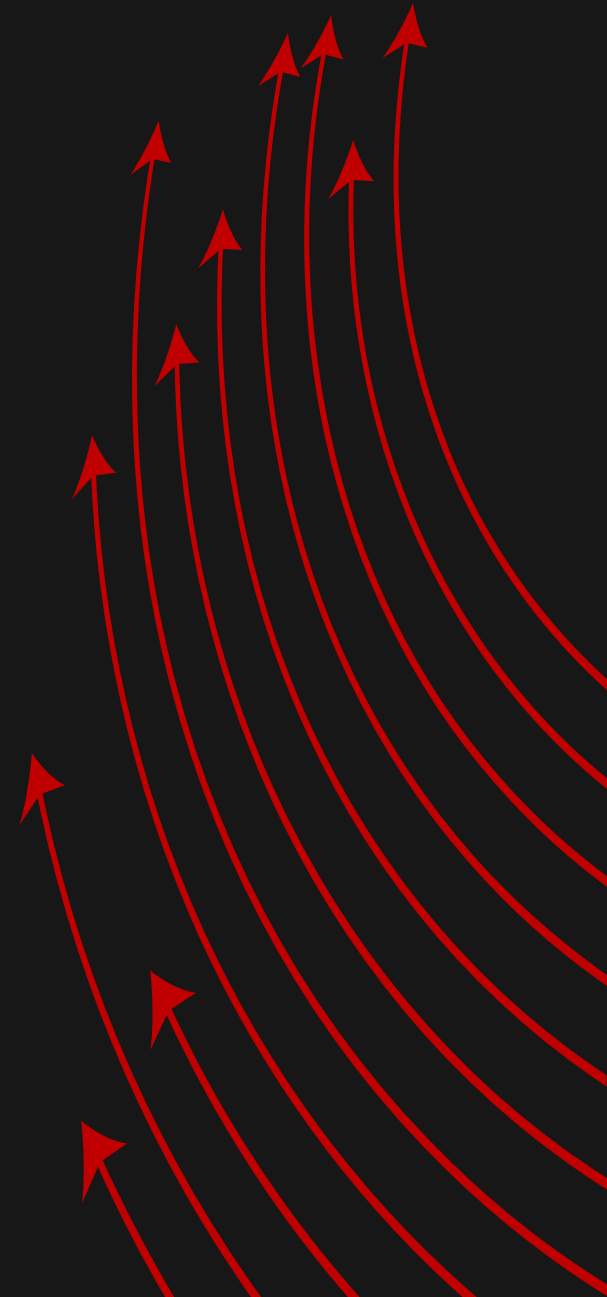
## ***It's good for:***

- Training individuals (versus teams)
- Domains with a clear "right" or "wrong" answer
- Getting learners through a lot of content quickly
- Content with clearly defined levels of difficulty
- Freeing up instructor resources

## ***It's less useful for:***

- Hands-on skills training
- Ill-defined domains
- Assessments that use open response formats (e.g., essays)
- Content where everyone must have the same experience to ensure compliance

*Note: Just because something is possible does not mean it's worth doing.*



# Adaptive learning technology components



## Learner Model

Information about what the learner already knows, based on a pre-assessment or continuous performance assessment.

## Domain Model

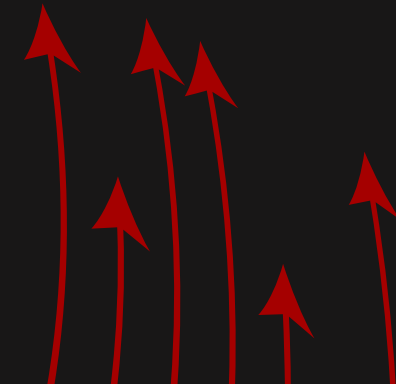
Information about the subject matter to be learned.

## Pedagogical Model

Instructional strategies used to teach the subject matter.

## User Interface

How the learner interacts with the technology



# Real world examples



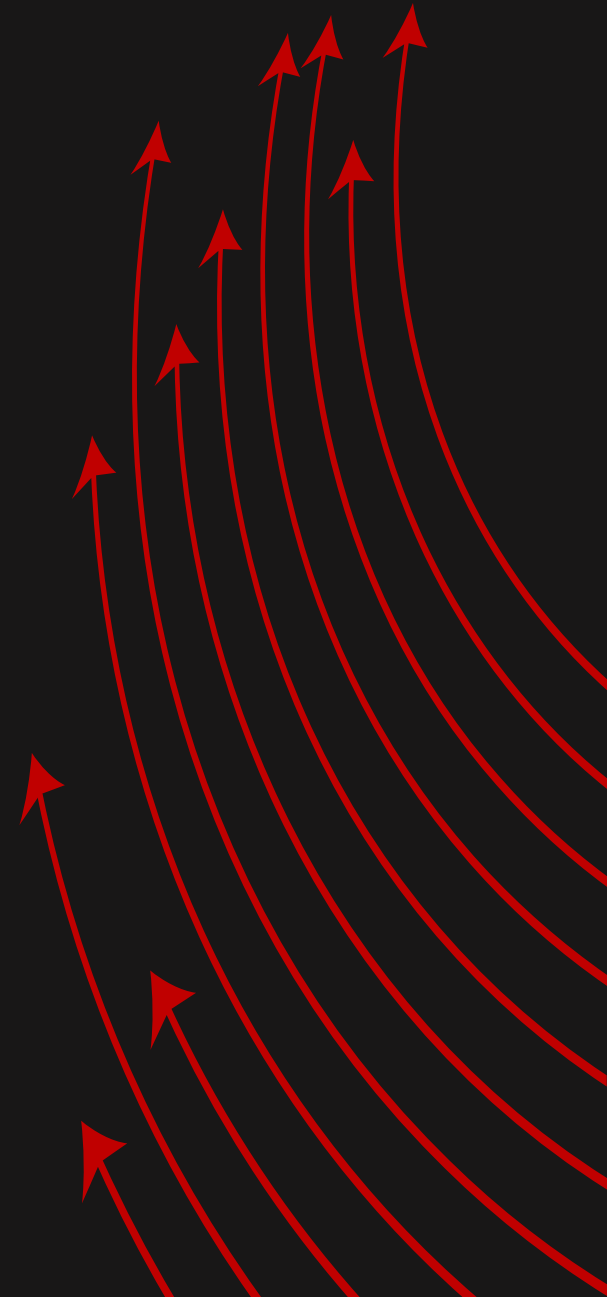
McGraw Hill Connect provides companion adaptive training for its textbooks. Difficult topics are reinforced through repetition until the student masters each chapter.



Duolingo provides tailored language exercises based on a pre-assessment of fluency and continued monitoring of performance.



Noom provides customized instruction for behavior change based on the user's goals.

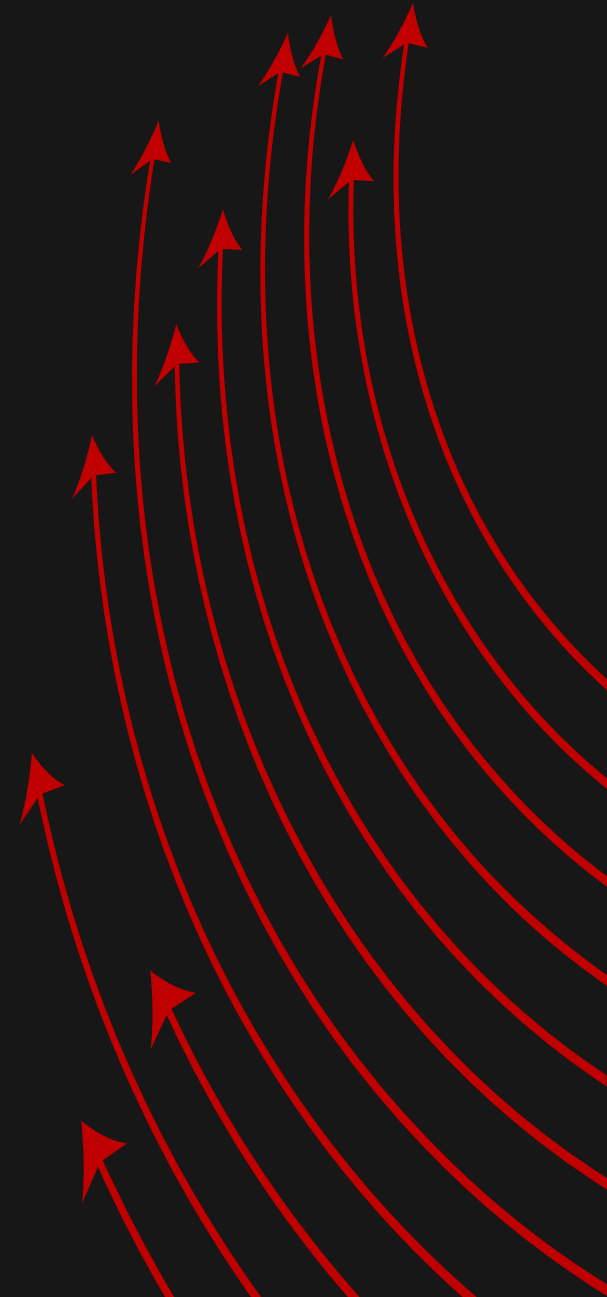


# Modern LMS capabilities

These days, most COTS learning management systems (LMS) provide some adaptive capabilities.

Use cases:

- Streamlined progression through course material
- Intelligent tutoring
- Learning “journeys”
- Tailored content to learner’s interests or job category



# Barriers to adoption



## More work for instructional designers

- Requires a lot of content, which must be created or reformatted
- Content requires metadata (topic area, difficulty level)



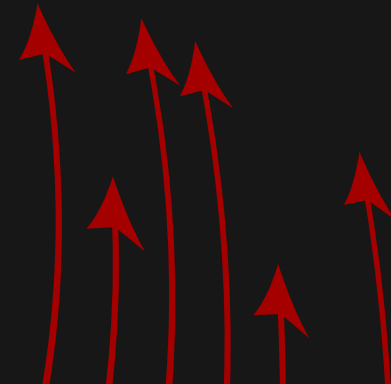
## Organizations don't have technology infrastructure

- Ability to collect and manage detailed information about learners
- Usually requires high-speed internet
- Cybersecurity requirements



## Organizational policies are too rigid

- Compliance training requirements (time on training, uniformity of experience)

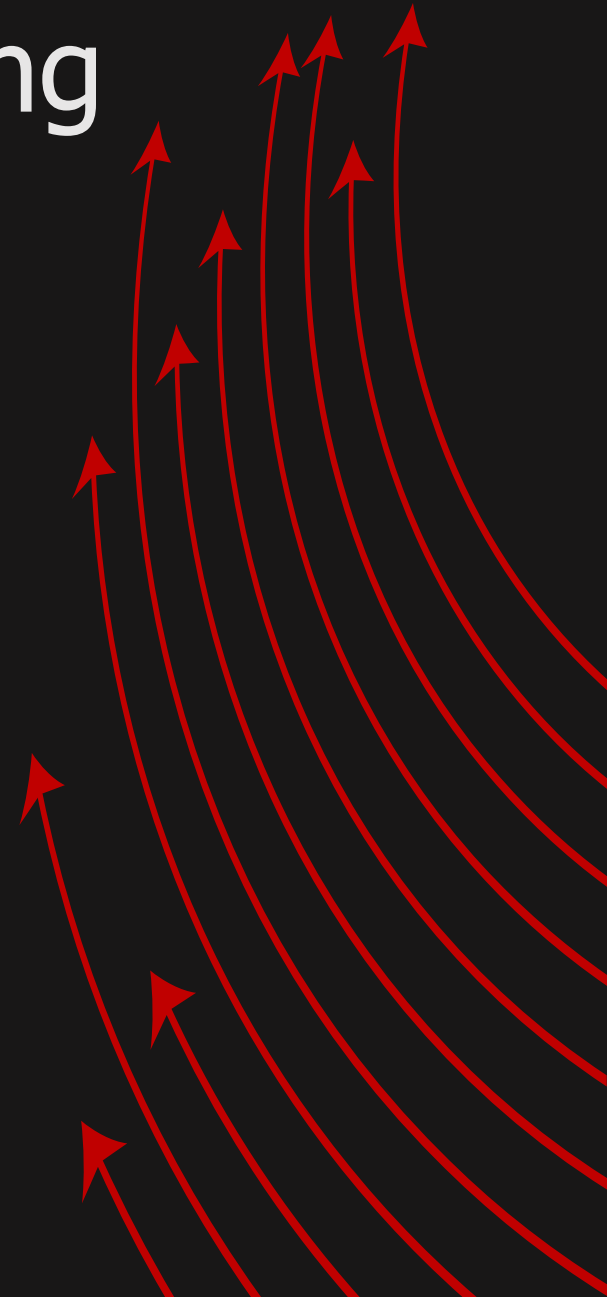




# Generative AI and adaptive learning

Large language models (e.g., ChatGPT, Google Bard) are changing how adaptive learning is developed and administered.

- Automating content creation
- Automating assessment development
- Conversational tutoring



# Automated content creation



Please write content for a microlearning course on the different types of rocks found on Earth for the sixth grade. Include information about the names and definitions of different types of rocks, how rocks are formed, and where they are found. Each topic area should be covered in no more than a paragraph. Include a check on knowledge in the form of multiple choice questions after each topic.



[View other drafts](#) ▾



Sure, here is the content for a microlearning course on the different types of rocks found on Earth for the sixth grade:

## Igneous Rocks

Igneous rocks are formed when molten rock (magma or lava) cools and solidifies. There are two main types of igneous rocks: intrusive and extrusive.

- **Intrusive igneous rocks** form when magma cools and solidifies below the Earth's surface. They are typically coarse-grained because they have more time to cool and crystallize. Examples of intrusive igneous rocks include granite and gabbro.
- **Extrusive igneous rocks** form when lava cools and solidifies on the Earth's surface. They are typically fine-grained because they cool more quickly. Examples of extrusive igneous rocks include basalt and rhyolite.

## Sedimentary Rocks

Sedimentary rocks are formed from the accumulation of sediments, which are particles of rock, minerals, and organic matter. Sediments can be transported by wind, water, or ice. When sediments are deposited, they are compacted and cemented together to form sedimentary rocks.

There are three main types of sedimentary rocks:

- **Clastic sedimentary rocks** are formed from fragments of other rocks. Examples of clastic sedimentary rocks include sandstone, shale, and conglomerate.
- **Chemical sedimentary rocks** are formed from the precipitation of minerals from water. Examples of chemical sedimentary rocks include limestone and dolomite.
- **Organic sedimentary rocks** are formed from the remains of plants and animals. Examples of organic sedimentary rocks include coal, oil shale, and natural gas.

## Metamorphic Rocks

Metamorphic rocks are formed when existing rocks are changed by heat, pressure, or reactive fluids. The original rock is transformed into a new rock with a different texture and composition.

There are three main types of metamorphic rocks:

- **Contact metamorphic rocks** are formed when existing rocks are heated by magma or lava. Examples of contact metamorphic rocks include hornfels and skarn.

# Automated assessment development



Using the content on this website: <https://solarsystem.nasa.gov/planets/overview/> please generate 10 multiple choice questions to test someone's knowledge of the material. Write the questions at the sixth grade reading level. Give each question four possible answers, with one correct answer. Indicate which answer is correct.

View other drafts



Sure, here are 10 multiple choice questions to test someone's knowledge of the solar system:

1. Which planet is the closest to the sun?

- Mercury
- Venus
- Earth
- Mars
- Answer: Mercury

2. Which planet is the largest in the solar system?

- Jupiter
- Saturn
- Uranus
- Neptune
- Answer: Jupiter

3. Which planet is the only one in the solar system known to support life?

- Earth
- Mars
- Venus
- Mercury
- Answer: Earth

4. Which planet has the most moons?

- Jupiter
- Saturn
- Uranus

# Intelligent tutoring



## ChatGPT

 Examples	 Capabilities	 Limitations
"Explain quantum computing in simple terms" →	Remembers what user said earlier in the conversation	May occasionally generate incorrect information
"Got any creative ideas for a 10 year old's birthday?" →	Allows user to provide follow-up corrections	May occasionally produce harmful instructions or biased content
"How do I make an HTTP request in Javascript?" →	Trained to decline inappropriate requests	Limited knowledge of world and events after 2021

Assume the role of an elementary school teacher. Your job is to teach me the capitals of the 50 states of the United States. You will do this by presenting me a series of multiple choice questions. Each question will ask me what the capital of a state is and provide me four options. One of them will be correct, the other three will be incorrect answers but will be the names of other large cities in that state. After my answer to each question, you will provide me feedback. If the answer is incorrect, you will provide me the correct answer. You will keep a running tally of the percentage of correct to incorrect responses I make. Along with the feedback you provide me, you will tell me my overall score as we go.

# Takeaways

- Adaptive learning technology enables more effective, efficient knowledge and skill acquisition while reducing instructor workload
- Consider your specific use case when deciding to invest in any learning technology
- In the near future, barriers to implementing this instructional approach will be reduced thanks to artificial intelligence





# Questions?

Dr. Jennifer Solberg

Quantum Improvements Consulting

[jsolberg@quantumimprovements.net](mailto:jsolberg@quantumimprovements.net)

