AI-POWERED
UDL STRATEGIES

Leveraging Artificial Intelligence to
Implement Universal Design for Learning

Jérémie Rostan

TABLE OF CONTENTS

TABLE OF CONTENTS

TABLE OF CONTENTS

INTRODUCTION:

Two Problems *Equal* One Solution

Defined by CAST as a "framework to improve and optimize teaching and learning for all people based on scientific insights into how humans learn", Universal Design for Learning is certainly a source of inspiration for classroom educators around the world. However, it often remains an aspiration rather than a daily practice, simply because of the gap between the demands of this ideal and the resources (starting with time) available to educators to make it a reality. UDL, as a colleague recently described it to me, is "a gentle beast... but a beast nonetheless." Even more dramatically, the monstrous powers of AI demonstrated by interactive bots such as ChatGPT have recently split school communities into two camps, with some seeing an existential threat to learning in what others hope will help revive and transform education.

Fortunately, two complex problems often equal one simple but powerful solution; and such seems to be the case here: using AI to implement UDL through easily accessible, efficient, and scalable strategies. This would not only help make the ideals of equity and personalization a reality, but also help ensure that the "God-like" capabilities of machine learning are used responsibly and to the benefit of humankind in the educational context–and thus, eventually, everywhere else. This short guide is a first step in this direction, listing 90 AI-Powered UDL Strategies. While version 1.0. will need to be updated over time as we learn more about the impact of AI in education, and as AI technology itself evolves, the conclusion of this e-book already lays out our next steps to make sure schools reap the full potential benefits of AI, all while avoiding its pitfalls.

Recommendation. AI tools such as ChatPDF or Mano can help you **chat with this e-book** to identify strategies and tools for a specific purpose (a meta-AI strategy). An **updated list of tools** is always available here. While some are specialized, others like MagicSchool and EduAide can do most things. Since many are ultimately based on the same artificial intelligence as ChatGPT or Bard, their functionalities are often available directly from these **chatbots**—provided they are properly prompted. Tools should thus not be the main focus here. Much more important are the underlying strategies. And **what matters most, ultimately, is the mindset that AI can and should be used to help remove barriers to learning**.

Disclaimer. Tools are mentioned in this e-book for illustrative purposes only. Hyperlinks are not endorsements or indications that particular options are better than alternative or competing ones. Likewise, all tools listed here retain the general limitations of AI, including unreliability. Educators are invited to try them and, if they so desire, to teach their learners how to use them appropriately, i.e., with good critical thinking, to **learn with and about AI**—including its strengths and weaknesses.

Acknowledgement. Some of the AI-Powered UDL Strategies presented here were inspired, one way or another, by the many ideas already shared online by experts and early adopters alike. While specific origins can be hard to trace back, I do want to acknowledge the work of Dr. Philippa Hardman, Andrew Herft, and Stephen Taylor. Likewise, I have to thank the innumerable and often anonymous contributors to the many platforms where I first came across the tools used to illustrate these strategies.

AFFECTIVE NETWORKS
THE **WHY** OF LEARNING

For Expert Learners who are Purposeful and Motivated

Provide multiple means of **ENGAGEMENT**

PROVIDE OPTIONS FOR RECRUITING INTEREST

Optimize choice and autonomy

01 Use chatbots to generate ideas and create the necessary materials to increase learner choice, e.g., by proposing **alternative topics**, **contexts**, **activities**, and **assessments** for your units and lessons.

02 Use chatbots to generate ideas and create the necessary materials to increase learner autonomy, e.g., by prompting them to turn a unit or lesson plan into a learner-led inquiry, starting with a **guiding question** and aligning your progression with an **inquiry cycle** (Rachel French, Kath Murdoch).

03 Teach learners how to use chatbots to **guide (generate research questions) and structure their own inquiry**. Extensions such as WebChatGPT can give ChatGPT free internet access.

04 Teach learners how to use tools such as Perplexity to **explore these research questions**, and Heuristica to investigate concepts through mindmaps. Metaphor and Talk to Books are also easy ways to find resources, while Andi (is well adapted for younger learners).

05 Teach learners how to use tools such as the following to **analyze resources**: MaxAI, Mano (for webpages), ChatTube (for videos), and (by order of complexity) Poe, ChatPDF, ChatDoc, Paper Digest, ExplainPaper, Elicit, SciSpace, and Petal (for PDF).

Optimize relevance, value, and authenticity

06 Teach learners how to use tools such as Clearer Thinking to clarify their own **beliefs**, **values**, and **identities**.

07 Use chatbots to generate ideas for creative and appropriate ways to **learn about learners**' identities and interests (e.g., to design an engaging survey), and use this as an opportunity to build connections with tools such as Along.

08 Use chatbots to **process learner survey** results anonymously and **align** the options mentioned above (topics, contexts, activities, and assessments) with learners' identities and interests.

09 Use chatbots to brainstorm **debatable questions**, or generate **startling statements** aligned with learning objectives and learners' identities and interests.

10 Teach learners how to use chatbots as a **debate partner**, e.g., to check for logical fallacies, provide contradictory evidence, generate counter arguments, or new perspectives, when responding to these guiding questions and startling statements.

11 Use chatbots to generate ideas and create the necessary materials to increase your units and lessons' authenticity and **real-life connections**. E.g., ideas for anchoring phenomena.

12 Use chatbots to generate ideas and/or the necessary materials to create individual or team games where learners have to reach a goal by gaining and applying knowledge, understandings, and skills in simulated real-life scenarios. Alternatively, use tools such as Classcraft to **"gamify"** units and lessons or Kwizie to turn videos into gamified quizzes.

13 Use chatbots to recommend adaptations and create the necessary materials to align your units with the Gold Standard of **Project-Based Learning**. E.g., identify public products and authentic audiences.

14 Use chatbots to generate ideas of actions (projects) learners can take, applying their learning to solve **real-world problems**. E.g., aligning your progression with the service learning cycle (Cathryn Berger-Kaye).

15 Not without irony, use chatbots to design **summative assessments** where AI can be used to enhance but not replace learning. Examples include avoiding the "invisible middle", as recommended by Stephen Taylor, potentially leading to exhibitions of learning, such as GOA's Artifacts of Excellence.

16 Use chatbots to suggest **interdisciplinary connections**, such as IDUs, based on curriculum maps, and/or educator surveys; and/or use chatbots to design "choose your own adventure" inquiries allowing small groups to **explore topics from different perspectives**.

Minimize threats and distractions

17 Use Along to build **rapport** with learners.

18 Clarify expectations around the **safe, ethical, and productive use of AI** by educators and learners, and integrate them into your schools' learning culture and practices. This can be an opportunity for participatory leadership and learner empowerment.

19 Co-design shared **class agreements** (not limited to AI) with learners and use this as an opportunity to teach them how to use chatbots as a tool for **collaborative thinking**, e.g., by guiding them through a nominal group technique.

PROVIDE OPTIONS FOR SUSTAINING EFFORT AND PERSISTENCE

Heighten salience of goals and objectives

20 Teach learners how to use chatbots to make connections between their broader (e.g., skills, dispositions, of life-based) goals and particular units and lessons. This can include **self-assigned personalized learning** plans and strategies.

Vary demands and resources to optimize challenge

21 Use chatbots to design and process the results of general UDL-aligned tests, as well as unit-specific **diagnostics** of learners' needs and current ability levels.

22 Use chatbots to determine the **prerequisite knowledge, understandings, and skills** needed for given units or lessons, as well as potential extensions. Many tools can help create the materials needed to address such needs efficiently, including: Copilot, Almanack, Schemely, Hilink, and Mindsmith.

23 Use chatbots to identify and address **potential difficulties** specific learners or groups of learners might have relative to the explicit curriculum (taught knowledge, understandings, skills, and dispositions).

24 Use chatbots to create lesson plans aligned with your standards' progressive benchmarks (proficiency scales), as well as different versions of your unit / lesson plans and activities / **materials based on learners' needs** and starting ability levels. This can include different starting (prerequisites) and/or end points (extensions), pacing, playlists, and/or pathways, as well as scaffolds.

25 Use chatbots to create **adaptive learning activities** (e.g., increasing or decreasing in difficulty based on learners' responses) and generate ideas and materials for meaningful and engaging extension activities.

26 When using an inquiry-based approach, use chatbots to create structured-, guided-, and independent-**inquiry options**.

27 Teach learners how to use tools such as Tutorai.me or Heuristica for **open inquiries**.

Foster collaboration and community

28 Teach learners how to use chatbots as a **tool for collaboration** (e.g., to generate norms, define roles and responsibilities, propose timelines, create peer review protocols, or facilitate group discussions, guiding them through protocols such as the nominal group technique).

29 Teach learners how to use advanced/AI-powered **project and team management** apps, such as ClickUp.

30 Invite learners to use tools such as Clearer Thinking to learn about and practice effective **communication and collaboration skills**.

Increase mastery-oriented feedback

31 Use chatbots to create standards-based **rubrics** describing mastery levels aligned with your proficiency scales.

32 Use machine learning tools such as Nyckel, Progressay, or AWS to **automate the grading** of assignments based on standards. TopMarks can do the same even for handwritten work, and provide feedback based on official rubrics (e.g., IB). Use Chrome extensions such as Brisk to provide **automatic, personalized feedback** on essays in Google Classroom.

33 Use chatbots to ensure your feedback is aligned with your preferred model for effective **feedback** (e.g., Grant Wiggins' 7 Keys) and aligned with your rubrics and standards. In addition, teach learners how to use chatbots as effective feedback machines.

34 Use chatbots to create follow-up and **automatically graded activities** enabling learners to immediately apply the feedback they receive. Tools like Quizalize can also create responsive quizzes adapting to learner results.

35 Use chatbots to analyze and summarize the qualitative and quantitative feedback to and from learners, as well as to propose ways to **adapt instruction**.

36 Use chatbots to generate ideas for different ways to check learner understanding and **collect and analyze data** to monitor learners' progress and suggest **instructional responses**.

37 Use AI (e.g.,SheetFormula, Olli, Noteable, Rapidminer, Tableau, or Code Interpreter with ChatGPT Plus) to **analyze learner data** collected from interactive tools such as Yippity, Quizalize, Kwizie (for videos), or your traditional Kahoot, Blooket, Pear Deck, and Ahaslides.

38 Use chatbots to process extensive / larger **checks for understanding** outputs than educators can read daily/weekly.

PROVIDE OPTIONS FOR SELF-REGULATION

Promote expectations and beliefs that optimize motivation

39 Use the efficiency gains made possible by the use of AI to increase the frequency of 1:1 **face-to-face conferences**.

40 Invite learners to use tools such as Clearer Thinking to learn about and practice surpassing **self-limiting beliefs**.

Facilitate personal coping skills and strategies

Although it cannot and should not replace counseling, AI does provide options for learners to develop coping skills and strategies.

41 Invite learners to use tools such as Clearer Thinking to learn about and practice **emotional intelligence and self-management skills**, e.g., self-compassion, reframing negative emotions, replacing unhelpful coping strategies. More socio-emotional learning apps are listed by Classcraft.

42 Invite learners to use tools such as Replika to **talk to an avatar**, combining privacy/safety and connectedness. Personal AI chatbots such as Pi are another option.

43 Invite learners to use AI-powered **mindfulness and psychological support** apps and websites. Make sure they are endorsed by relevant organizations, such as the APA.

Develop self-assessment and reflection

44 Use chatbots to create materials that will support **learner self-assessment** (e.g., keywords, checklists, 1-point rubrics).

45 Teach learners how to use chatbots as a **self-assessment tool**, asking for specific and actionable feedback based on rubrics.

46 Use chatbots to create questions aligned with standards and success criteria / proficiency scale that learners can use to assess and **reflect** on their performance and **draw actionable lessons**.

RECOGNITION NETWORKS
THE **WHAT** OF LEARNING

For Expert Learners who are Resourceful and Knowledgeable

Provide multiple means of **REPRESENTATION**

PROVIDE OPTIONS FOR PERCEPTION

Offer ways of customizing the display of information

47 Encourage learners to use Reader View to **decrease cognitive load** and facilitate the use of AI supporting tools (such as MaxAI or Mano) when working online.

Offer alternatives for auditory information

48 Leverage **speech-to-text** capabilities embedded in AI tools such as Fireflies, and Fathom, including live closed captions and class capture and automatic transcription.

Offer alternatives for visual information

49 Leverage **text-to-speech** capabilities embedded in AI tools such as Text Magic, Natural Reader or TTS Reader.

PROVIDE OPTIONS FOR LANGUAGE AND SYMBOLS

Clarify vocabulary and symbols

50 Use chatbots to determine the **key vocabulary** needed to access a unit/lesson and achieve the targeted standards, as well as to create a glossary.

51 Use tools such as Frequency Level Checker, Road to Grammar, or English.com to determine the **linguistic complexity** of your materials (including glossary), and Diffit to generate **graduated versions**.

52 Use chatbots to generate **English-to-English translations**, breaking down complex expressions into simpler and more accessible ones.

53 Teach learners how to use tools such as Rewordify to **clarify vocabulary and symbols**. Many of the tools mentioned above (05) can also help define, paraphrase and simplify webpages and PDF.

Clarify syntax and structure

54 Teach learners how to use the tools mentioned above (05) to **explain the syntax and structure** of texts. E.g., turning long sentences or paragraphs into bullet points, or making the logical progression of an argumentation explicit.

Support decoding of text, mathematical notation, and symbols

55 Teach learners how to use the tools mentioned above (05) to **summarize and decode** webpages and PDF e.g., by asking clarifying questions or examples.

Promote understanding across languages

Although it cannot and should not replace the expertise of ESL or learning specialists, AI does provide options for emergent multilingual learners as well as for learners with different learning needs or learning differences.

56 Use chatbots to determine the key vocabulary needed to access a unit/lesson and achieve the targeted standards, as well as to create a **translated glossary**.

57 Use Language Level or other similar tools to determine your learners' level of **English proficiency**. While these are not nearly as accurate as the longer tests a learner would take with a specialist, they are, in their absence, still more reliable than the subjective impression educators otherwise have to rely on.

58 Use tools such as Twee to **support literacy** by transcribing and creating quizzes on Youtube videos, generating dialogues and debates with open questions, practicing vocabulary and grammar with exercises, and more.

59 Use tools such as Frequency Level Checker, Road to Grammar, or English.com to determine the linguistic complexity of your materials (including glossary), and chatbots to create **graduated versions** as necessary.

Illustrate through multiple media

60 Teach learners how to use tools such as Socratic to **access texts, visuals, and videos supporting understanding** and Brilliant to learn (STEM courses) through interactive visual problem-solving. Chatbots can also be used to create or interpret diagrams and graphs.

61 Use chatbots to create (or describe) Mermaid (for diagrams) and MatPlotLib (for graphs) code, which can be viewed in compilers such as Mermaid.live and Tutorialspoint. Teach learners how to use text-to-image generators to visualize abstract ideas. Options include Craiyon, Stable Diffusion, Mage.Space, DeepAI, and Scribble Diffusion (scribble-to-image).

PROVIDE OPTIONS FOR COMPREHENSION

Activate or supply background knowledge

62 Use chatbots to determine the **prerequisite knowledge** and understandings, for given units or lessons, and to create the necessary strategies and materials to activate them. To supply them, see 21.

63 Use chatbots to generate insightful **analogies** and metaphors, as well as **interdisciplinary connections**, for complex concepts.

64 Use chatbots to identify **common misconceptions**, as well as to design proactive unlearning activities, such as this one by Dr. Philippa Hardman.

Highlight patterns, critical features, big ideas, and relationships

65 Teach learners how to use chatbots as a tool to **guide and support their understanding** (e.g., examples/counterexamples, pattern recognition, abstraction, connection) including **automatic mindmapping** with tools such as diachat.

66 Use chatbots to break down knowledge, understandings, and skills, into simpler elements and explain them at different **levels of complexity**.

Guide information processing and visualization

67 Use chatbots to derive **proficiency scales** from standards and sequence the learning into progressive steps.

68 Use chatbots and tools such as Diagramify to **generate and illustrate checklists** for key elements of the proficiency scale (concepts, skills), and to create memorable routines and acronyms for meta-cognitive skills.

69 Teach learners how to use chatbots as a **more knowledgeable other** modeling, checking, correcting, and extending their understandings and skills - and as an error machine calling for **attention and critical thinking**.

70 Teach learners how to use tools such as Socratic, Photomath, or WolframAlpha to receive **step-by-step explanations in math** and other subjects. Schools and districts can also invest in Dreambox for personalized math (and reading) learning solutions.

71 Teach learners about the "artificial intelligence" behind chatbots, and help them use this understanding to refine their AI literacy and thinking skills, including prompt design, prompt engineering, and more generally computational thinking.

Maximize transfer and generalization

72 Use chatbots to **plan the progression** of standards/benchmarks over years units/lessons, as well as to plan opportunities for practice and review of targeted understandings and skills throughout the year/unit.

73 Teach learners how to use chatbots and tools such as Anki, Quetab, and Monic as personal tutors and study buddies helping them **develop their study skills** (e.g., SQ3R, Feynman technique, method of loci, cued recall, free recall, recognition, spaced practice, interleaving) and create study guides, flashcards, learning plans, and self-assessments.

74 Use chatbots to generate ideas for opportunities to generalize and **transfer learning** to new situations.

STRATEGIC NETWORKS
THE **HOW** OF LEARNING

For Expert Learners who are Strategic and Goal-Directed

Provide multiple means of
ACTION and **EXPRESSION**

PROVIDE OPTIONS FOR PHYSICAL ACTION

Vary the methods for response and navigation

75 Encourage learners who might need it to use extensions such as Voice Search, which allow users to conduct onlines searches through **speech recognition**.

Optimize access to tools and assistive technologies

76 Encourage learners who might need it to use AI-powered **speech-based commands**, including speech-to-text options and tools, such as voice typing in Google Docs, or VoiceControl to talk to and hear from ChatGPT. Google Bard can receive prompts and share its outputs in audio format as well. It can also **interact with uploaded images**.

PROVIDE OPTIONS FOR EXPRESSION AND COMMUNICATION

Use multiple media for communication

77 To avoid cognitive overload when allowing learners to demonstrate their learning using creative tools the mastery of which is not a learning objective (e.g., video editing,podcast recording, drawing), teach them how to use **AI creative assistants** such as Craiyon, Stable Diffusion, Mage.Space, DeepAI (text-to-image), Scribble Diffusion (scribble-to-image), Photoroom (photo editor), Fliki and Murf (voice).

Use multiple tools for construction and composition

78 Teach learners how to use chatbots to guide and support them through the process and **strategies of composition** (e.g, lab report, persuasive essay writing).

79 Teach learners how AI-detectors such as ZeroGPT, GPTZero, Originality, or Copyleaks, work, and use this understanding to clarify what is meant by **personal "voice"** and to develop learner's skills (critical thinking, editing, writing).

Build fluencies with graduated levels of support for practice and performance

80 Use chatbots to **backward-design** your learning sequence, ensuring all summatively assessed standards are formatively practiced and acquired in line with your proficiency scale.

81 Use chatbots to ensure learning is active by generating **hands-on activities**. You can use specific bots for scientific activities and experiments, general bots such as ActivGenie, or create your own bots using tools such as AppGen, Poe, or Bitlife.

82 Use AI-powered quiz generators such as Conker, Yippity, Quizalize, Quilgo, Quizgecko and Kwizie to help students **automate knowledge and skills**. Practice Sets provide learners with **differentiated practice opportunities** on Google Classroom.

83 Use chatbots to create **responsive formatives**, e.g., quizzes where errors prompt automatic explanations and new attempts, while success leads to increasing levels of complexity on the proficiency scale. Tools such as Quizalize offer such functionalities for quizzes.

84 Use chatbots to generate guided (e.g., structured and aided by worked examples, semi-worked examples, and annotated exemplars of different levels of achievement), semi-guided (e.g., markschemes) and unstructured **opportunities to practice** skills and demonstrate knowledge and understanding.

PROVIDE OPTIONS FOR EXECUTIVE FUNCTIONS

Guide appropriate goal-setting

85 Teach learners how to use tools such as Clearer Thinking to guide and support their **goal-setting**.

Support planning and strategy development

86 Teach learners how to use tools such as Rationale to make **better decisions** and Clearer Thinking or Goblin Tools to organize their work, manage their time, plan and communicate effectively, and develop good habits.

87 Teach learners how to **create AI-bots** or use AI to code apps or extensions to complete tasks more efficiently using tools such as AppGen, Quetab, or Poe.com.

Facilitate managing information and resources

88 Teach learners how to use advanced, AI-powered **project management** platforms such as ClickUp.

89 Teach learners how to use AI to **identify, test, and assess AI tools** using tools such as Future Tools or Futurepedia.

Enhance capacity for monitoring progress

90 Teach learners how to use AI-powered tools, such as Simple ML, Noteable, or Code Interpreter (ChatGPT Plus) to **visualize and analyze their own performance and progress data**.

CONCLUSION:

Harnessing the Full Power of AI in Education

The 90 AI-Powered Strategies shared in this e-book will hopefully help educators implement UDL practices even more systematically than they already do by decreasing the amount of time and busy work required to identify and adapt to learners' identities, interests, and needs. However, they remain a first step in a much longer process. To reap the full potential benefits of AI in education, it will also be necessary to:

- Go from "what" strategies can be used to "how" they can be executed, which will involve providing exemplars, detailed instructions, and develop tutorials and training programs. In particular, educators (and learners) will need to develop a good command of prompt-design. This will require an effective model aligning and going beyond the many prompt-engineering frameworks that have already been proposed. To be effective, this effort will not only need to be supported by ongoing coaching, but more generally be preceded by appropriate change leadership strategies creating the necessary culture, structure, nurture, and architecture.

- Extend the previous beyond UDL strategies. This includes helping educators use AI to offload time-consuming tasks that have little direct impact on learners, but also exploring the application of AI to curriculum and instructional design beyond UDL. Here, what will be needed is an integrated model aligning UDL and all other major approaches to teaching and learning (such as standards-based, concept-based, mastery-based, and inquiry-based learning).

- Investigate whether AI can help design, not only the approach to learning, but also its content, helping us think through "what" learners should learn as much as "how" they can learn it.

- Clarify, based on the previous, the best use of educators' and learners' time in a learning environment transformed by the emergence of AI.

- Explore the ethical and philosophical considerations raised by the ongoing disruption of education by AI, and proactively and effectively address the challenges created by the introduction of AI in school communities. While they are many and multifaceted, an overarching question seems to be: how can we ensure AI enhances rather than replaces human thinking?

- Respond to the challenges and opportunities created by AI, beyond the classroom, for school leaders, e.g., in relation to hiring, professional learning, and indeed leadership itself.

ABOUT THE AUTHOR:

Jérémie Rostan

Jérémie Rostan has over 15 years of experience in international education and currently serves as High School Curriculum and Instruction Coordinator at International School of Panama.