

Saudi Arabia
Centre for the
Fourth Industrial
Revolution

المعهد الوطني
للتطوير المهني التعليمي
National Institute
For Educational Professional Development




وزارة التعليم
Ministry of Education

Pathways to AI Integration in K-12 Education: Building on Momentum in Saudi Arabia

May 2026

Table of Contents

Foreword	4
Executive Summary	5
1 Introduction	7
2 Stakeholder-Centered Integration Framework	11
2.1 Teaching & Learning	12
2.2 Capability Building	17
2.3 Infrastructure & Accessibility	25
2.4 Governance & Policy	28
2.5 Ethics	30
Path Forward	32
Acknowledgements	33
List of Figures	34
List of Tables	34
Appendix	36

Acronyms

AI	Artificial Intelligence
GenAI	Generative Artificial Intelligence
LLM	Large Language Model
C4IR	Centre for the Fourth Industrial Revolution
WEF	World Economic Forum
MoE	Ministry of Education
NeLC	National eLearning Center
SDAIA	Saudi Data and AI Authority
NIEPD	National Institute of Educational Professional Development
OECD	Organisation for Economic Co-operation and Development
MCIT	Ministry of Communication and Information Technology

Definitions

Artificial Intelligence

is a field of study and type of technology characterised by the development and use of machines that are capable of performing tasks based on advanced statistical predictions.¹

Generative Artificial Intelligence

is a branch of artificial intelligence that relies on machine learning techniques and deep neural networks to simulate the human ability to produce original data and content.²

Large Language Model

a category of deep learning models trained on immense amounts of data, making them capable of understanding and generating natural language and other types of content to perform a wide range of tasks.³

Synthetic Media

any content, such as audio, images, or video, generated by artificial intelligence.⁴

Education 4.0

a forward-thinking framework for teaching and learning that equips learners with the skills, attitudes, and values essential for the future. It focuses on two dimensions of learning: Content and Experience.⁵

Ethical thinking

the process of identifying and describing ethical issues in a variety of contexts, articulating the ethical considerations involved in different responses to those issues, and providing a rationale for a position that addresses those considerations.

¹ World Economic Forum. [What is artificial intelligence and what is it not?](#). (2023, March 20).

² Saudi Data and AI Authority. [About AI](#). (2024).

³ IBM. [Large language models](#). (2024).

⁴ UNESCO. [Deepfakes and crisis: Knowing what's real](#). (2024).

⁵ World Economic Forum. [Education 4.0 Alliance: Overview](#). (2024).

Foreword



Managing Director's Statement

Dr. Basma AlBuhairan

Managing Director, C4IR Saudi Arabia

It is my pleasure to present this paper on the governance and policy of GenAI in K-12 education in the Kingdom of Saudi Arabia. The integration of emerging technologies into our classrooms represents a profound opportunity, and an equally important responsibility, to ensure that innovation aligns with our national values, safeguards our learners, and advances the goals of Saudi Vision 2030.

Saudi Arabia has already taken decisive steps toward responsible AI adoption. With the leadership of the Saudi Data and AI Authority, the Ministry of Education, the National eLearning Center, and the National Institute for Educational Professional Development, the kingdom has established strategies, frameworks, and tools that reflect both global best practices and national priorities. As GenAI becomes embedded in the daily lives of students and teachers, the need for coherent governance and actionable policies are more critical than ever.

Building on this foundation, this paper amplifies the voices of teachers, policymakers, and stakeholders who have emphasized that trust, ethics, and inclusiveness must be at the heart of

any national strategy. It identifies opportunities to strengthen standards, establish robust oversight mechanisms, and ensure that our schools have the leadership, skills, and safeguards they need. Above all, it underscores that governance is not a one-time exercise but an adaptive process that must evolve alongside technology and classroom realities.

At the Centre for the Fourth Industrial Revolution Saudi Arabia, we are proud to contribute to this important national dialogue. By convening partners across government, academia, industry, and civil society, we aim to ensure that the kingdom is not only prepared for the challenges of GenAI but also positioned as a global leader in shaping its responsible use.

I would like to extend my gratitude to all the experts, teachers, and institutions that contributed to the development of this work. Together, we are charting a path where technology serves the mission of education, empowering every learner, supporting every teacher, and strengthening the kingdom's human capital for generations to come.

Executive Summary

The rapid integration of GenAI across global sectors is reshaping how systems operate, and education is no exception. As AI becomes a core layer of the economy, it is changing how knowledge is created, accessed, and applied. AI adoption in education is not a technological choice but a strategic pathway to transition the education system from a transferring knowledge system to transferring skills system, to build a ready workforce aligned with Saudi Vision 2030 priorities and the strong local momentum of digital transformation.

Without clear governance and coordinated action, GenAI adoption creates uncertainty and potentially erodes trust among teachers, students, and parents. This paper outlines national efforts and tactical steps to responsibly integrate AI for all education stakeholders in Saudi Arabia. Drawing on the Artificial Intelligence in Digital Learning (AIDL) framework, expert interviews, multi-stakeholder workshops, global benchmarking, and a national survey of 44,920 teachers.

A stakeholder-centered strategic framework was developed around five pillars. For each pillar, we identify a **priority action** that anchors the pillar, followed by recommendations.

1. Teaching & Learning: Pilot the AI Assessment Scale protocol, which gives teachers and students guidance on when AI use is appropriate in class and when it is not. The Scale is the lever that keeps students cognitively active and ties every classroom AI use back to a defined learning objective.

2. Capability Building: The Ministry of Education and its partners have launched substantial national programs to support teacher development in AI and digital skills. More than 146k teachers have been trained showing that educators are willing and motivated to use AI. To optimize training programs going forward, we **recommend a roadmap for national skill-gap diagnostics** for capability building so that training is targeted. The upskilling roadmap organized into three stages:

1. Identify skills gap through:

- Standardized placement tests for teachers to establish a national

baseline and inform individual growth plans.

- School principal assessments of staff readiness, adding contextual insights but potentially subject to personal bias.

2. Choose the right delivery model via a blended approach that combines:

- In-person training for intermediate and advanced competencies.
- Synchronous workshops for applied basic technical skills.
- Asynchronous modules for general knowledge.
- The model duration targets 12–15 hours to build integrated basic competencies.

3. Scale delivery by:

- Introducing a train-the-trainer program in each region to build local capacity for awareness and basic skills.
- Paired with a structured incentive program to reward deep expertise, community support, and innovation in AI use.

3. Infrastructure & Accessibility: Saudi Arabia has established a robust digital learning ecosystem in response to COVID-19 global lock down. A strong foundation in digital learning system includes classifying of school-level readiness so that gaps and needs are visible at a school-by-school level. From there, an end-to-end stack is built across sector-specific opportunities, including platform integration guides, an AI-in-Schools security profile, an EdTech interoperability profile, accessibility-conformance criteria in procurement, and a research-sandbox-policy pipeline that turns pilots into systematic evidence for policy ensuring that innovation is guided by responsibility and ethics.

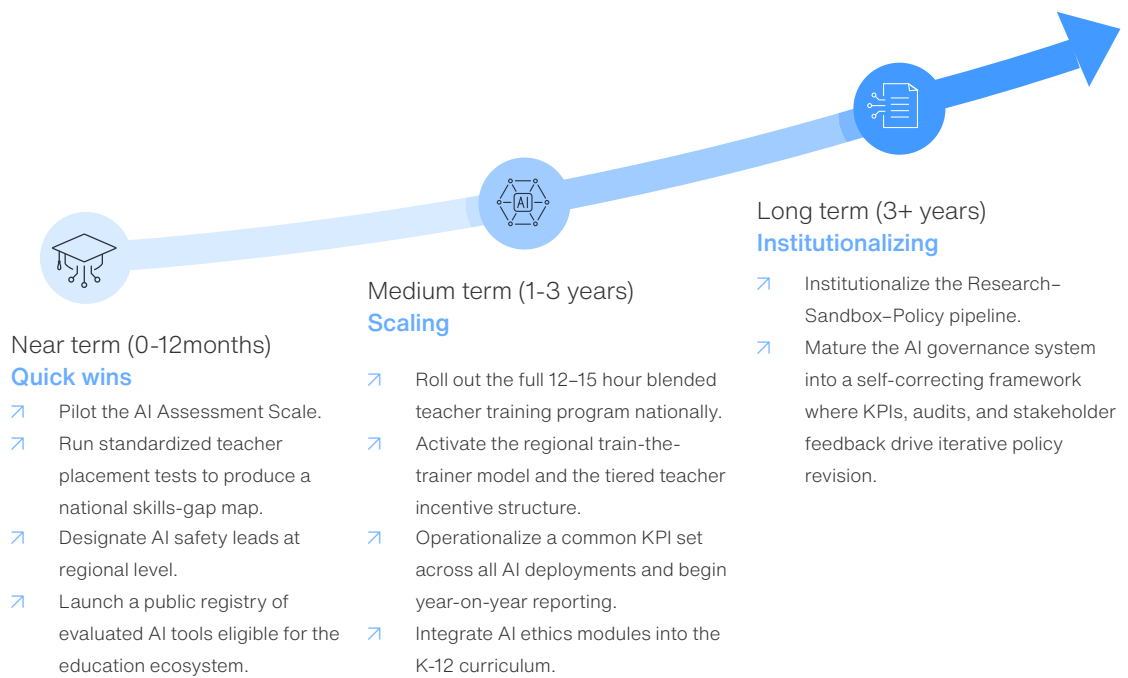
4. Governance & Policy: The ministry of Education GenAI guideline framework is grounded in core educational values. Building on this momentum, **a centralized oversight and accountability system prevents** incidents and misuse. Three governance mechanisms operationalize this:

- **Oversight:** Each region appoints an AI safety representative to log and audit misuse incidents, reporting to a centralized steering committee.
- **Evaluate:** Mandate the classification and evaluation of AI tools that are eligible for use within the education ecosystem.

- **Monitor:** Require all AI deployments to adhere to a common KPI set, ensuring consistent measurement and comparability across regions and initiatives.

5. Ethics: Teachers, parents, and students all play an active role in shaping how AI is used. **A strong foundation of digital literacy is built with an ethics-by-design baseline anchored on national AI ethics principles.** The framework identifies key ethical risks such as biased data misuse, inequality, cultural misalignment, safety failures, and unclear accountability, and matches each with targeted mitigations tailored to the education ecosystem.

The recommendations above are not equal in readiness, cost, or dependencies. We illustrate a path forward on a time horizon over which they can be pursued.



This framework builds on existing momentum in Saudi Arabia's digital and AI initiatives. It highlights current progress while addressing the specific challenges the system must overcome to lead globally in technology-responsive education.

The aim is not simply to introduce GenAI tools into classrooms, but to guide their use in ways that cultivate an informed, capable generation, ready to navigate future challenges and contribute to a dynamic, AI-enabled economy.

Introduction

The momentum to modernize skills in Saudi Arabia is firmly anchored in Vision 2030's Human Capability Development Program, which emphasizes:

1. Flexible education system,
2. Future-ready job market preparation, and
3. Lifelong learning.

Building on the Ministry of Education's groundwork in establishing a digital learning ecosystem, a strategy for AI in education, and the GenAI national guidelines, the kingdom is advancing its digital transformation to meet the demands of the rapidly evolving job market^{7,8,9,10}. Recent studies estimate that 20.5% of jobs in the kingdom are at high risk of automation, and more than 40% of current work tasks could already be automated with existing technologies¹¹. This reality makes it clear that traditional educational models of transferring knowledge will not be sufficient in an increasingly digital world where information can be retrieved from multiple resources¹². **Saudi Arabia is strategically leveraging GenAI in education, supported by advanced governance frameworks led by SDAIA, NeLC, and other related entities to rethink classrooms as places where students build and develop the skills that matter most for the future.**

The adoption of AI across various sectors in Saudi Arabia is driving market growth. The EdTech market in the kingdom was set to attain \$1.9 billion by 2024¹³. While the global AI-in-education market was projected to grow from about \$5.9 billion in 2024 to more than \$32 billion by 2030¹⁴, reflecting increasing demand for technology-enabled learning experiences.

Recent studies indicate that over 86% of students use AI globally for studies¹⁵. Teachers in the kingdom are also embracing the shift.

The national Teacher Survey analysis shows that more than half of K-12 surveyed teachers (71%) strongly believe that AI has a positive impact on enhancing engagement and improving learning outcomes, and 44% of them use it on a daily basis¹⁶ (see Figure 1). The question is no longer whether AI will enter classrooms, but rather which problems it should be deployed to solve, and how it should be governed.

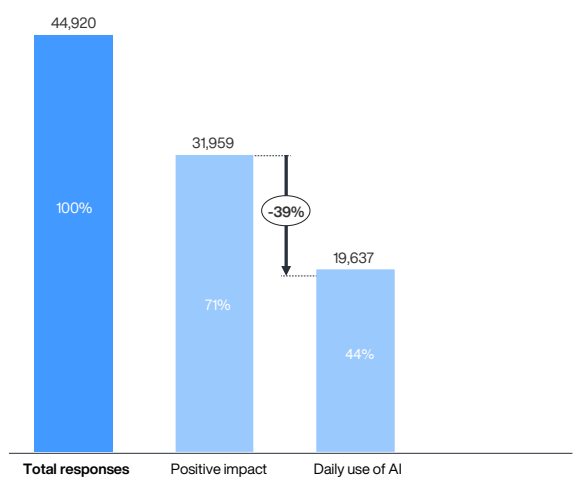


Figure 1: Teachers' perceptions of AI's impact are predominantly positive, and they're embracing the shift toward GenAI-enabled education using AI tools daily.

⁷ Competencies For Using AI in Digital Learning," National eLearning Center. (2025).

⁸ Regulations and Guidelines for the Use of GenAI Tools and Applications in Digital Learning," National eLearning Center

⁹ Guideline for Using Generative Artificial Intelligence in General Education," Saudi Data & AI Authority, Ministry of Education. (2025).

¹⁰ AI Ethics Principles," Saudi Data and AI Authority. (2025).

¹¹ McKinsey Global Institute. The future of work in the Middle East: Technology and employment in Saudi Arabia. (2023).

¹² UNESCO. AI and education: Guidance for policymakers. (2021).

¹³ IMARC Group. [Saudi Arabia edtech market size, growth & forecast 2025–2033](#). (2025).

¹⁴ [Grand View Research](#). AI in education market size, share & trends analysis report by component, deployment, technology, application, end use, and region; forecasts 2025–2030. (2024).

¹⁵ [Digital Education Council](#). What students want: Key results from DEC global AI student survey 2024. Digital Education Council. (July 2024).

¹⁶ [National Teacher Survey on Generative AI in Education](#)," C4IR, Ministry of Education, and National eLearning Center. (2025).

The Ministry of Education has aligned with Vision 2030 mandate by rolling out an AI curriculum for grades 4-12, which commenced in the 2025–26 academic year. This step marks a shift from rote learning to applied digital proficiency.



Using GenAI in education holds significant promise for improving how we can approach learning and deliver a national mandate. Through three modes of engagement, learning about AI from curriculum content, Learning with AI by using AI as tools to teach and learn other subjects, and using AI applications at a system-level outside teacher-student interactions for summaries, administration dashboards, scheduling, and back-office automations. Each mode targets different problems.

Within this frame GenAI value to each stakeholder becomes more specific:

- **For students,** integrating GenAI can create highly personalized learning materials tailored to their individual learning style and skills gap to build a digital-native nation.
- **For teachers,** GenAI could reduce workload by automating tasks and by creating Synthetic Media to streamline instructional design (e.g., generating slides, producing exercises & quizzes). This allows teachers to spend less time on preparation and more time on mentoring and providing formative feedback.
- **For parents,** GenAI can provide real-time insights to summarize student progress, areas of struggle, and suggest home-based reinforcement practices to involve families in their children development.

Education goals to reach Saudi Vision 2030 mandate:

- **For students:** Ensuring that educational outcomes are compatible with labor market needs and building an integrated educational journey.
- **For teachers:** Elevate the level of professional educational practices by creating diverse professional pathways and multiple development channels of training.
- **For parents:** To be involved and aware of all aspects of their children's development.

The goal of this paper is to outline crucial next steps toward the responsible integration of GenAI in the education system, enabling all stakeholders to achieve their educational goals. A comprehensive integration framework is presented, with clear localization methods for global best practices that will position the kingdom as a leader in the landscape.

What Is Synthetic Media?

Synthetic media refers to content generated, enhanced, or manipulated by GenAI rather than solely created by humans. It includes various media formats (text, audio, images, video, and interactive experiences).



AI-generated text to compose essays, summarize reading material, brainstorm ideas, and refine writing.



Text-to-speech and AI voice assistants convert written content into natural-sounding audio.



AI-generated video to visualize content and create high-quality moving pictures.



AI chatbots and intelligent tutoring systems offer personalized, real-time feedback and interactive support.



Interactive AI characters offer virtual environments based on real-world scenarios.

Methodology

In collaboration with the Ministry of Education and the National Institute for Educational Professional Development in Saudi Arabia, along with other key stakeholders, we have developed an evidence-based framework for the responsible adoption of GenAI tools and synthetic media in K-12 education. The work presented in this paper progressed in five stages:



► Discovery: Literature Review

A **systematic literature review of local and international publications** was conducted to establish a comprehensive baseline of current practices and evidence related to GenAI and Synthetic Media in K-12 education. The sources reviewed included government strategies and guidelines, peer-reviewed studies, and national and global standard reports. Drawing on government and national publications ensured continuity with ongoing initiatives and supported the structuring of the framework for this paper. Insights from this process were used to shape the research questions and inform subsequent analysis and recommendations.

► Benchmark: Global Best Practices

A **benchmark study was conducted across six countries** to cover the global best practices, including the United States of America as a leader in AI, Finland as a leader in education, South Korea & Singapore as representative sample of Asia, United Arab Emirates to benchmark a similar culture as Saudi Arabia, and Australia as a leader in innovative education. This study aimed to contextualize local findings within the broader landscape of global best practices. Benchmarking criteria were selected to encompass all framework dimensions, and each criterion was systematically scored to identify current gaps and opportunities relative to what has been officially published by the country's educational department. Detailed descriptions of the scoring system and the benchmarks are provided in Appendices. The analysis and synthesis of the benchmark results were

validated by some of our expert community, acknowledged in this paper.

► Deep dive: Expert Interviews & National Teacher Survey

A series of **13 structured interviews** was conducted across the Saudi Educational ecosystem, engaging with policymakers, school principals, teachers, EdTech providers, and AI specialists. These interviews mainly explored ongoing initiatives that had not yet been published and the critical domains essential to the responsible integration of AI in education. The resulting transcripts were analysed thematically to identify both convergent opportunities and specific challenges within the implementation context.

In parallel, a national survey was designed and administered to assess Saudi teachers' awareness of GenAI, their perceived benefits and risks, and their technical and pedagogical readiness. The survey comprised 40 questions covering teaching & Learning pedagogy, ethics and barriers, digital infrastructure & accessibility. **It successfully sampled 44,920 teachers across the kingdom** and helped provide numerical estimates of the national teacher population to build evidence-based insights. The survey response profile is available in Appendix 2, and the dataset analysis methodology is described in the original Survey Report. The analysis of the survey data revealed key insights into barriers and opportunities for AI adoption in education, and relevant findings have been incorporated throughout this paper.

» Co-design: Multi-Stakeholder Workshops

Insights were stress-tested through **three multi-stakeholder workshops**. The first two workshops included representatives from Government, Academia, and Industry and featured collaborative exercises to co-design response plans for common risks associated with integrating AI in classrooms. These workshops were instrumental in understanding teachers' behaviours and experience in the classroom, yielding tangible outcomes, including drafted classroom protocols for AI-assisted content creation, teacher professional development pathways, and a shortlist of policy enablers. The third workshop focused specifically on teachers, providing a balance between high-level perspectives and field experience, while also delivering awareness training for participating teachers. The outcomes of all workshops directly informed recommendations in this paper.

» Review: Synthesis and Expert Validation

Finally, a structured validation cycle was conducted with field experts. Recommendations were refined to align with local context and global best practices, ensuring coherence with current national policies, initiatives, and relevant international guidance.



Stakeholder-Centered Integration Framework

The integration of AI into everyday tools, content, and workflows makes it essential to foster shared awareness. Stakeholders engage with AI in different contexts and hold varying expectations; therefore, **raising awareness across all stakeholders is necessary to establish a shared baseline of knowledge** and promote a culture of responsible use. In practice, this requires developing plain-language guides for families, classroom-ready examples for teachers, operational procedures for school administrators, and public reporting that enhances trust.

A structured framework was consolidated from the NeLC AIDL¹⁷ to guide the responsible integration of GenAI in K-12 education. The framework is **based on five pillars**, each of which maps responsibilities to a specific education stakeholder group, with the final pillar, “Ethics,” crosscutting all stakeholders, and collectively covering the entire educational ecosystem.

Stakeholder-Centred Strategic Framework

1. Teaching & Learning

Leveraging GenAI to support personalized learning, increase student engagement, and prepare students for future skills

Stakeholder: Students

3. Infrastructure & Accessibility

Ensuring all schools have the digital foundation to support equitable use of GenAI

Stakeholder: Administrations

5. Ethics

Promoting awareness, responsibility, transparency, age-appropriate, and culturally aligned use of GenAI

Stakeholder: Family & Community

2. Capability building

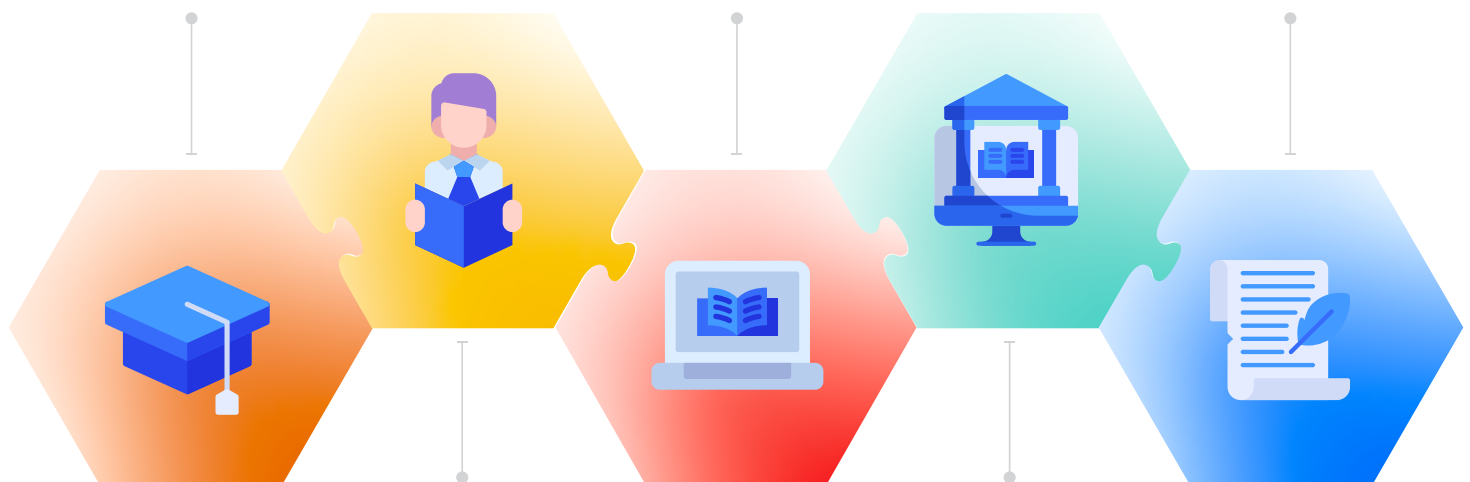
Preparing teachers and administrators to understand, assess, and apply GenAI responsibly and effectively

Stakeholder: Teachers

4. Governance & Policy

Establishing national standards and governance mechanisms to ensure safe and scalable integration

Stakeholder: Government



¹⁷ nec.gov.sa/en/node/2929



1. Teaching & Learning

The outcomes of education in the context of using GenAI tools are expected to improve through two major shifts¹⁸:



Personalized and interactive learning



Improved teacher efficiency

Impact of GenAI on the classroom



Personalized and interactive learning

- **Tailored lessons:** GenAI customizes lessons to individual pace and ability, supporting differentiated instructions to match the student's pace to improve learning efficiency.
- **Real-time feedback:** GenAI tools give students instant feedback, enabling continuous revision and improvement for faster learning cycles and increased student autonomy.



Improved teacher efficiency

- **Student engagement:** Increase interactive activities such as storytelling, simulations, and gamified challenges to engage students and tailor the learning experience.¹⁹
- **Assessment:** Testing oral defenses, learning journals, and AI-use disclosure rubrics that emphasize reasoning and process over final product quality to get better visibility into student thinking and learning.
- **Streamline admin tasks:** Automating tasks (e.g., quiz generation, lesson preparation) significantly saves teacher time for mentoring and direct support to students.
- **Data aggregation and dashboards:** Tools powered by AI like Insights consolidate student data into unified dashboards, enabling teachers to quickly identify learning gaps and make data-driven instructional decisions.

Teachers' adopting GenAI tools in their educational tasks has the potential to **improve their efficiency and effectiveness** as reported by OECD study¹¹. If used properly, GenAI applications could enhance teachers' ability to design lessons for different levels, streamline administrative tasks, and focus more on guiding and monitoring. **The real promise of GenAI isn't about replacing teachers with AI assistants; it is about augmenting human potential and encouraging responsible use of technology.**

Teachers play a crucial role in providing a sense of ethical guidance and fostering thoughtful learning in every step of the learning process. This vision reflects the World Economic Forum's Education 4.0 framework²⁰, which focuses on two dimensions of learning: Content and Experience, both of which are

foundational for self-paced and autonomous learning to become future-ready.

The impact of GenAI tools to **improve personalized and interactive learning** will accelerate the learners' journey and ensure equity & accessibility to information, enabling continuous practice and improvement. Such impact was highlighted by OECD and underscored from two expert interviews that have implemented an AI system in their classroom. However, this potential is **coupled with significant risks on the learning journey associated with the use of GenAI**. Notably, 40% of surveyed teachers in Saudi Arabia believe that using GenAI in school poses a risk to students' critical thinking. Additionally, multiple studies have started to show a negative impact of GenAI on critical thinking^{21,22}.

¹⁸ [The potential impact of Artificial Intelligence on equity and inclusion in education | OECD](#)

¹⁹ Insight scored by an educator in an expert interview

²⁰ [World Economic Forum. Shaping the future of learning: The role of AI in Education 4.0. World Economic Forum. \(2024\).](#)

²¹ [The Impact of Generative AI on Critical Thinking](#)

²² [ChatGPT's Impact On Our Brains According to an MIT Study | TIME](#)

Here we outline key risks associated with integrating GenAI into teaching & learning, addressing a balance to ensure students remain cognitively active. These risks can arise from well-intentioned actions if they are not properly monitored and lack continuous human oversight.

Risk	How it could start	Mitigating factors
Over-reliance Students lean on AI too much, losing chances to practice problem-solving and creativity	- Depending on AI “advice” evolves into not being capable of addressing novel or unexpected challenges - Teachers’ generating full lesson plans and stop adapting them to their students - Students rely heavily on AI hints instead of struggling productively	- Balance between AI integration with human-centred approaches to protect the teacher-student relationship - Design tasks that AI cannot meaningfully replace (e.g., oral exams, presentation skills)²³
Misinformation Convincing but false content undermines media literacy and trust	- Using AI as a research tool and copy references - Sharing deepfake images and video	- Endorse the use of GenAI when integrated with a vetted knowledge base at school - Require students to validate information beyond the AI tool and provide references beyond online resources (e.g., from library)
Biased content AI reflects biases existing in training data, reinforcing stereotypes or excluding voices	- AI generating cultural or religious answers - AI generating stereotypical gender roles answers	- Raise awareness among teachers and students about potential AI biases - Provide training for teachers and students on identifying and addressing algorithmic biases²⁴

²³OECD Digital Education Outlook 2023

²⁴Algorithm Bias – Synthetic Data Should Be Option of Last Resort When Training AI Systems | United Nations University

Risk	How it could start	Mitigating factors
Erosion of critical thinking Passively accepting AI output weakens the capacity to question and reason	— Students extensive use of GenAI for step-by-step solutions — Erosion of critical thinking through cognitive offloading ²⁵	→ Pedagogical designs focus on questioning, distinguishing fact from opinion → Giving students AI-generated content to critique → Teach students to cross-validate information
Well-being concerns Unmonitored AI can expose users to harmful and deceptive content, risking mental or physical well-being	— Increased screen time to generate homework	→ Maintain balance between digital and non-digital activities in school to ensure AI is balanced with offline learning ²⁶ → Provide guidance and support to promote students' mental well-being when using AI tools

Cognitive offloading: refers to the process by which humans delegate cognitive tasks to external tools or systems²⁶.

Strategic approach to integrate GenAI to learning outcomes

Saudi Arabia education transformation is already underway, with several pioneering models in action^{27,28}. With these foundations in place, the question is how to ensure GenAI is integrated into classrooms in a balanced way to ensure students meet the designed learning objectives and remain cognitively active. At a system level, GenAI can be embedded through a strategic shift in the assessment model, moving from evaluating final products to assessing the learning process, allows us to redefine how student achievement is measured.

To address this, we propose adopting the “**AI assessment Scale**” protocol that offers teacher guidelines on when to use AI in the classroom and when NOT to, aligned with each lesson’s objectives.

The challenge: Uncertainty and inconsistency of AI applications in the classroom

Solutions: Adopt “AI Assessment Scale” protocol²⁹. The scale allows teachers to think differently about assessments by outlining a range of actions to adopt AI while remaining human-centric.

Example: Level 4 “Full AI” the student must use GenAI to create content, then analyze it critically, as part of the assessment.

Recommendation: Pilot “AI Assessment Scale” Protocol to test its effectiveness and develop practical examples to explain classroom-ready cases tied to learning objectives so teachers can use GenAI consistently and confidently.

²⁵[The Personalized Learning Revolution](#)

²⁶[OECD Digital Education Outlook 2023](#)

²⁷ الذكاء الاصطناعي والتعليم الرقمي: منظور تحولي وخارطة طريق | المركز الوطني للتعليم الإلكتروني

²⁸[Guide to AI Prompt Engineering in Digital Learning | National eLearning Center](#)

²⁹[AI Assessment Scale \(AIAS\) – Resources and information for the AI Assessment Scale \(AIAS\)](#)

Table 1: The AI Assessment Scale (AIAS) (2025 Mike Perkins, Leon Furze, Jasper Roe, Jason MacVaugh)

1	No AI	This assessment is completed entirely without AI assistance in a controlled environment, ensuring that students rely solely on their existing knowledge, understanding, and skills. → You must not use AI at any point during the assessment. Your work demonstrates your own skills and knowledge.
2	AI Planning	AI may be used for pre-task activities such as brainstorming, outlining, and initial research. This level focuses on the effective use of AI for planning, synthesis, and ideation, but assessments should emphasize the ability to develop and refine ideas independently. → You may use AI for planning, idea development, and research. Your final submission should show how you have developed and refined these ideas.
3	AI Collaboration	AI may be used to help complete the task, including idea generation, drafting, feedback, and refinement. Students should critically evaluate and modify the AI's suggested outputs, demonstrating their understanding. → You may use AI to assist with specific tasks such as drafting text, refining and enhancing your work. You must critically evaluate and modify any AI-generated content you use.
4	Full AI	AI may be used to complete any elements of the task, with students directing AI to achieve the assessment goals. Assessments at this level may also require students to show how they used and refined AI to complete the task. → You may use AI extensively throughout your work where appropriate, or as explicitly directed in your assessment. Focus on directing AI effectively and critically evaluating the outputs you use.
5	AI Exploration	AI is used creatively to enhance problem-solving, generate novel insights, or develop innovative solutions to solve problems. Students can demonstrate advanced understanding of AI applications within the field of study. → You should use AI creatively to push the task beyond basic expectations, working closely with your instructor.

AI-Enabled Learning Accelerators in Saudi Classrooms

Reading fluency and comprehension, particularly in foreign languages (English), has long been a challenge in Saudi schools. Traditional approaches often left teachers with heavy grading workloads and limited capacity to provide individualized feedback. To address this, a team of Saudi teachers pioneered the use of Microsoft's AI-powered Learning Accelerators, beginning with Reading Progress and Insights inside Microsoft Teams, and later expanding to include Reflect (supporting social-emotional learning), as well as mathematics, presentation, and research tools. The model emphasized student autonomy, supported by dashboards for teachers and parental engagement sessions.

The results were significant. In traditional classroom settings, teachers typically spend extensive time listening to each student's reading individually and manually documenting accuracy and error patterns. At the same time, participation is often limited, with only 2-3 students volunteering or being

able to read aloud during a single lesson, usually those who feel confident or prepared. By contrast, the integration of AI-powered tools not only automates these processes, reducing workload by up to 8 hours per reading task for a cohort of 160 students, but also enables full participation, allowing all students in the cohort to engage in reading practice and receive feedback.

Over 27,000 assignments were logged, with some struggling learners showing up to 500% improvement in reading speed within one semester. Student satisfaction reached 94–98%. Shared reading materials were downloaded more than 130,000 times in Arabic, English, and Chinese, while tool guides were downloaded more than 30,000 times in Arabic and English. This initiative from independent Saudi teachers backed by the Ministry of Education demonstrates how GenAI can combine pedagogy, technology, and community engagement to transform learning.





2. Capability Building

The kingdom has placed human capability at the heart of national transformation, and education is the foundation for shaping a generation that is confident, innovative, and globally connected. Yet teachers are navigating the steepest adjustment shaped by the opportunities and challenges that GenAI offers. Many teachers are uncertain how to navigate students who use AI in their assignments, as the survey data indicate that more than 5,000 teachers are unsure what advice to give. Additionally, more than 18,000 teachers are concerned that their roles will be replaced by AI in the future.

To address these challenges, the **education system is investing in capability building** to ensure that the majority of teachers are empowered to use AI as an enhancement, not a substitute, for the teacher's role. Over time, this

approach will help create a more resilient teaching workforce capable of leveraging GenAI while upholding professional standards and human-centered values.

MoE, SDAIA, MCIT, NIEPD, NeLC and other entities **have launched national programs to support teacher development in AI and digital skills**³⁰ (See Figure 2), demonstrating substantial institutional commitment to professional development. These national programs have trained more than 146k teachers up to 2026. In parallel, the private sector has also contributed to teacher upskilling. For example, online platforms like Annaab, AIDalil, Annajah, and ULA offer professional development courses grounded in pedagogy. However, these offerings remain optional and vary in depth.



³⁰Data from National Institute for Educational Professional Development (NIEPD)

Year	Organizing Entity	Initiative Name	Participation
Total number of trained teachers under national programs			146,889
2024	NIEPD – MoE – MCIT – IBM	4 Training programs (Data science, AI, Cybersecurity, Cloud Computing) for computer science teachers	6,766
2024	NIEPD – MoE – MCIT – COURSERA	7000 courses in emerging technology	24,277
2025	NIEPD – MoE – MCIT – Microsoft	AI awareness initiatives	5,543
2025	NIEPD – MoE – MCIT – Microsoft	AI as a cognitive partner	1,307
2025	NIEPD – MoE – MCIT – Microsoft	AI Trainer Program	315
2025	NIEPD – MoE – Microsoft – Apple	Programing hour	870
2025	NIEPD-MoE-MCIT-Microsoft	Learning Accelerators + AI Assistant +Special Needs+ Responsible AI	26,302
2026	NIEPD-MoE-Microsoft	AI Hour Trainer Program	3,754
2026	NIEPD-MoE-Microsoft	Introductory Session: AI Hour in Education	17,629
2026	NIEPD-MoE-Microsoft	Design Assessment Instruments within Madrasati platform	38,162
2026	NIEPD-MoE-Microsoft	AI-Based Learning Accelerators	14,017
2026	NIEPD-MoE-Microsoft	Integrating AI Concepts and Skills into Skills and Technology Curricula	1,131
2026	NIEPD-MoE-Microsoft	Workshop: Using AI to Improve the School Environment	1,900
2026	NIEPD-MoE	Sustainable Learning in the Age of Artificial Intelligence	4,916

Figure 2: National Training Programs for teachers with reported number of participations (2025) showing total more than 53,000 teachers have been trained on AI basics.

While the **majority of surveyed teachers (81%) expressed interest in receiving additional training on GenAI tools**, 41% reported that they've had sufficient training opportunities, and 46% indicated that they are willing to pay additional costs for a high-quality training program (See Figure 3).

These findings reflect a strong commitment among teachers to enhance their skills and adapt to new educational technologies. They also suggest both a clear need and a substantial willingness to invest in comprehensive upskilling programs for teachers.

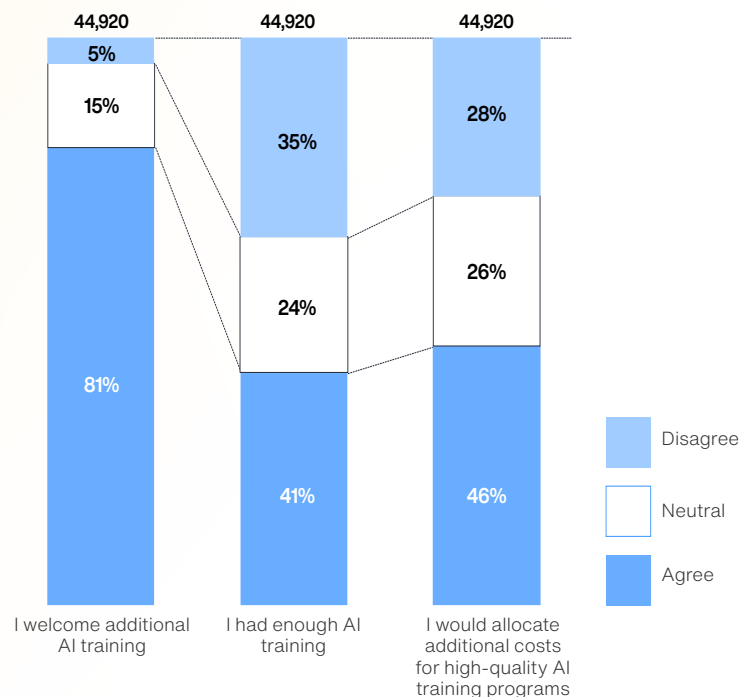


Figure 3: Teachers' Training Interest vs. Cost Willingness. Most teachers welcome additional AI training, and a big group are willing to financially invest in high-quality training programs.

The initial step in educational professional development is to **identify the specific training curriculum for teacher training aimed at achieving desired competency levels**. This can be developed internally or in partnership with external education providers to ensure effective training delivery.

After which, to deliver training content, experts at a round table workshop discussed tactical approaches to deliver nation-wide training. Based on that discussion, we outline a high-level **teacher upskilling roadmap in three stages**: stage one focuses on identifying the skill gap, stage two on selecting the appropriate upskilling model(s), and stage three on scaling delivery.

Teacher Upskilling Roadmap

Stage 1 Identify skill gap

Building on the NeLC competencies for using AI in digital learning framework, the initial step is to systematize skill identification and ensure all teachers can benchmark themselves against established competency standards³¹ As the report indicates seven fundamental categories to enhance teaching efficiency (see Figure 4). Each category has three proficiency levels: Basic, Intermediate, Advanced.

Content for teachers training program could be developed based

on the desired competency and professional level. For example, South Korea developed AI Digital Textbook, their capability building strategy is to train teachers how to use it³². In Singapore, through the SkillsFuture Level-up program they first help learners recognize skills that can be acquired, understand their level, then choose a suitable upskill³³. And Estonia developed their teachers' digital competency through their lifelong learning strategy focusing on IT training for both students and teachers.

³¹National eLearning Center. Competencies for Using AI in Digital Learning. (2025).

³²[Korea Ministry of Education will train teachers to effectively utilize artificial intelligence digital textbooks](#)

³³[SkillsFuture Festival Opening Forum | MOE](#)

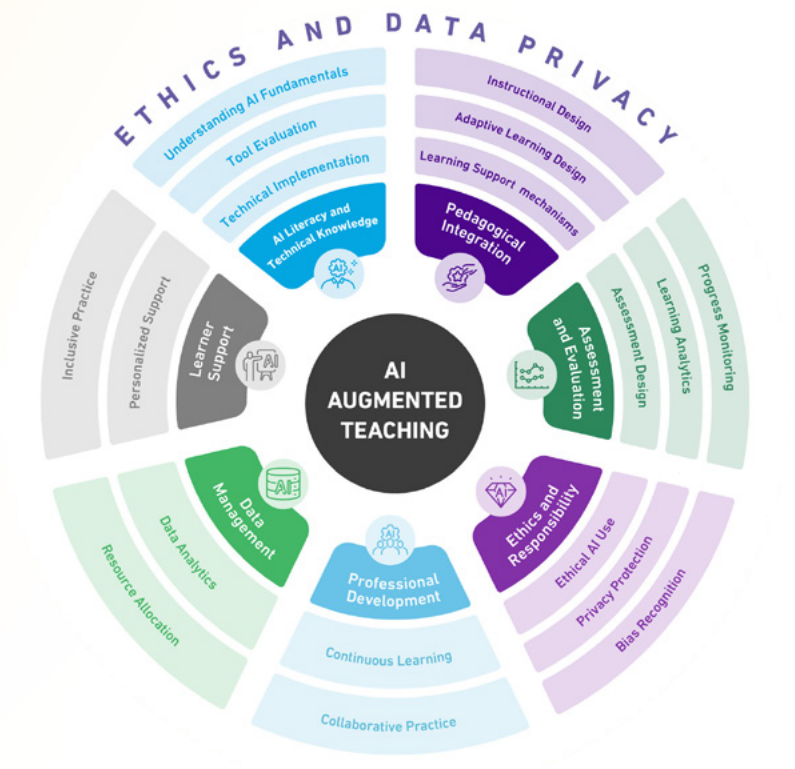


Figure 4: NeLC Competencies for using AI in digital learning

Team analysis from the National Teacher Survey took the **capability ladder** tool to assess teacher readiness, mapping their confidence from basic knowledge to practical application and effective lesson prompting. Survey data shows that while most teachers feel confident in knowing and using AI, their confidence in prompting skills drops by **28%** (See figure 5). This indicates that although teachers are using AI, they

have not yet reached a procedural or optimized level that genuinely saves time and enhances learning design. This self-reported gap between use and capability might be caused by theoretical AI training rather than hands-on practices in classrooms. Additionally, 84% of surveyed teachers reported that the most crucial skill they are interested in developing using GenAI is preparing presentations and lesson materials.

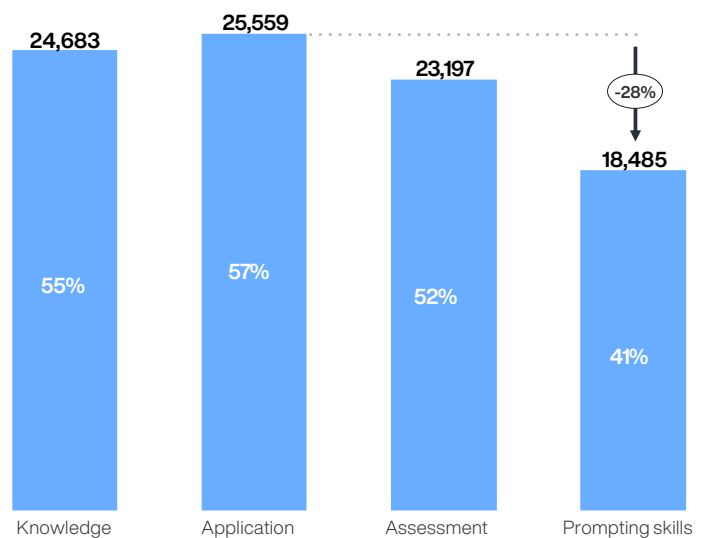


Figure 5: Teachers' self-reported GenAI capabilities

Despite the high level of awareness and training initiatives, there remains an opportunity to develop a coordinated action plan. To translate this momentum into sustained system-wide teacher empowerment, skill gaps must be assessed consistently for targeted professional development. Field experts at the policy workshop scored two complementary methods of skill assessment:

- 1. Standardized placement tests for teachers:** These tests establish a consistent baseline against the NeLC competencies across schools to understand teachers' level and can be used to customize individual growth plans. This assessment, based on practical exercises, would place teachers within one of the three proficiency levels. For example:

Proficiency level	Example Exercise (non-exhaustive)
Basic	Grading an essay using AI, troubleshooting a technical problem, flagging & solving a clear risk
Intermediate	Prompt to redesign the same lesson for different talent groups, Analyse student database
Advanced	Design a mini-assessment system that generates questions and automates feedback

Teachers with higher skill levels do not need to iterate on the basic proficiency level.

Recommended methods to identify skills gap:

- 1. Standardized placement tests for teachers:** These tests establish a consistent baseline across schools and can be used to customize individual growth plans. This step establishes a clear performance benchmark but fails to consider the context of the teacher.
- 2. School principals should assess the readiness and needs of their staff:** This approach provides a localized perspective that complements national standards. Through this method the principal can provide constructive feedback to encourage growth, but it could be influenced by personal bias.

- 2. School principals could evaluate the readiness and needs of their staff:** This approach provides a localized perspective that complements national standards. Through this method, the principal can provide constructive feedback to encourage growth. However, to reduce the risk of personal bias and ensure the process is reliable and fair, the evaluation must be guided by standardized tools such as a clear competency rubric, evidence-based observations and checklists, and scoring scales.

The assessment could be conducted once a year for each school to nominate a number of teachers for a more extensive training program delivered through NIEPD. Such a process request from principals could be through an online platform, ensuring transparency and fostering competitiveness.

Stage 2 Choose the appropriate model

Field experts at the policy workshop emphasized that the most effective way to train teachers on GenAI is through a modular, blended learning approach. Survey data shows that 46% of **teachers prefer in-person workshop model** to maximize engagement in their pedagogical training (See Figure 6). Yet a blended approach uses in-person workshops for Intermediate and advanced competencies, synchronous workshops for applied basic competencies, and technical exercises, and asynchronous sessions for general knowledge. Although “Learning from colleagues” or shared experiences is not a top priority for teachers, such option could provide access to supportive community during this transition.

In line with global best practices, for example, the MIT initiative on responsible AI for Social Empowerment and Education

(MIT RAISE)³⁴ have designed a flexible AI awareness curriculum that can be adapted to target groups, including Students, Teachers, Families, and can be adapted to duration; 1 day, 1 week, 1 month. This adaptable content contributed significantly to the Day of AI initiative, which offers an open-source curriculum that can be translated and implemented globally.

Experts in professional development from NIEPD estimate that an **integrated training module duration will require between 12 to 15 hours of training**, covering both technical and pedagogical basic competencies. This training can span over a three-month period, allowing teachers to balance their professional development with their primary responsibilities, as these modules are made compulsory for the designated professional development hours.

Recommended upskilling model:

- 1. Blended approach:** These tests establish a consistent baseline across schools and can be used to customize individual growth plans. This step establishes a clear performance benchmark but fails to consider the context of the teacher.
 - In-person training for intermediate and advanced competencies
 - synchronous workshops for applied basic competency technical exercises
 - asynchronous workshops for general knowledge
- 2. Model duration:** 12 to 15 hours in 3 months period for the integrated basic competency, including technical, pedagogical, evaluation & assessment.

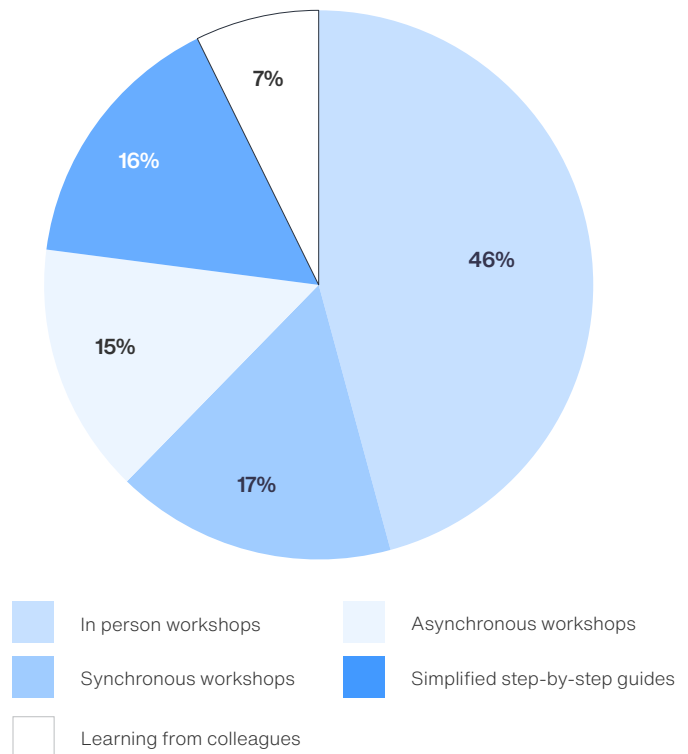


Figure 6: Teachers self-reported preferred methods of upskilling are primarily via in-person workshops.

³⁴[Day of AI | Homepage](#)

Stage 3 | Scaling delivery

Recommendations to scale teachers upskilling:

1. **Introduce train-the-trainer model:** One national training program in each region across the Kingdom to certify trainers to train the region. TTT model scales awareness and basic skills.
2. **Compliment with a structured incentive program:** Incentives to motivate teachers for deep expertise, community support, and innovation in AI.

To consistently expand the upskilling capacity, experts from SDAIA highlight the effectiveness of the **train-the-trainer model**, particularly through the younger generations of teachers. This approach enables early adopters to disseminate knowledge throughout their schools and regions. Ensuring quality can be achieved by choosing high-performing teachers as ambassadors and certifying them as trainers. For example, as a part of its Digital Transformation in Education, South Korea aims to train 300,000 teachers by 2026 through a similar approach. The plan involves training 34,000 “Leading Teachers” similar in the USA, state departments have assigned official tasks force to improve AI education. While Singapore is providing national micro-certifications in AI education.^{35,36}

In addition, a **structured incentive program** based on their competency and contribution can

further motivate engagement. Rather than imposing mandates, sharing success stories and providing incentives are recognized as more effective drivers of teacher participation. This recognition becomes especially valuable for teachers who take initiative in self-development, experimentation, and innovation to enhance learning outcomes.

For example, completing foundational training could count toward professional development requirements, while leading a school-wide GenAI initiative, mentoring peers, or contributing to national programs such as the NeLC Sandbox could earn a higher level of recognition. Such a program will create levels of proficiency among teachers to support the train-the-trainer model. Table 2 outlines a tiered incentive structure designed to reward efforts proportionally, promote autonomy in self-development, and enable innovation with AI tools.



³⁵Gambi, G., Yi, J.-Y., & Yang, H. M. [Implementing EdTech at scale: 3 lessons from Korea for digital transformation](#). (March 18, 2025).

³⁶Kwon, H. [The Ministry of Education will train 34,000 leading teachers who can effectively utilize artificial intelligence \(AI\) digital textbooks](#). (April 15, 2024).

Table 2: Structured incentive program based on their competency and contribution

Contribution Tiers	Teacher Contribution	Proposed Incentive
 Tier 1	Individual classroom practitioner: - Completion of GenAI training modules - Micro-credentials	Counts toward professional development hours
 Tier 2	School Champion - Demonstrated classroom impact - Mentor 5-10 peers	Mentoring peers counts as extra curriculum tasks for teachers
 Tier 3	Certified regional trainers - Certified by MoE/MIEPD - Deliver standardized PDs and support	Performance bonuses based on the number of certified teachers they trained.
 Tier 4	Policy & Piloting contribution - Contribution to national policy programs (e.g., NeLC Sandbox, SDAIA policy consultations) - Co-author models and lesson protocols	Inclusion in high-level forums and policy discussions. Support with devices (e.g., HUMAIN Horizon laptop)
 Tier 5	Innovation fellow Develop & Lead classroom pilots	Innovation grants, access to pilot funding, and career advancement

CASE STUDY

Aanaab – A National Platform for Scalable Teacher Development

Saudi Arabia is actively working to equip its educational workforce with modern teaching tools, including digital literacy and AI integration. Launched in 2019, Aanaab supports this by offering online teacher development programs, including licensing and qualifications, especially for K-12 teachers, with much of the content delivered in Arabic.

The platform serves over 200,000 teachers and about 250 schools across 10 Arab countries. It's backed by credible investors to expand its offerings and improve technology

infrastructure. Aanaab delivers courses to prepare teachers for licensing exams in Saudi Arabia, so that its content is integrated into the national eLearning ecosystem.

By leveraging online and hybrid delivery, certified credentials, and institutional partnerships, Aanaab is helping make professional development for teachers more scalable, accessible, and relevant to classroom practice.



3. Infrastructure & Accessibility

The ability to access the digital infrastructure in a realizable manner is the most fundamental consideration to enable digital learning³⁷. Saudi Arabia proved that in response to COVID-19, an inclusive digital learning ecosystem was established to reach every learner, from urban cities to small villages.

As AI adoption accelerates, survey data points to targeted infrastructure opportunities, particularly around school-level connectivity and sustainable access models for AI tools, that national initiatives are well-positioned to address.

Ensuring equitable access to technology must therefore remain a key priority for policymakers, alongside the challenge of maintaining infrastructure quality while scaling up AI adoption.

Technology infrastructure in education does not end at devices and internet accessibility; it also includes local cloud computing and secure storage, an interoperable data layer that connects the learning management system to AI services, and user-friendly

interfaces. These components must be supported by ongoing maintenance, helpdesk support, and targeted training for all stakeholders in the education ecosystem. **A comprehensive infrastructure stack can be structured around six main areas** to enable transparency in AI adoption by establishing a centralized, education-specific AI infrastructure. Each Area is defined with current efforts in Saudi Arabia and a potential opportunity to take it to the next level.

³⁷[Saudi Arabia's Digital and Distance Education : Experiences from the COVID-19 Pandemic and Opportunities for Educational Improvement](#)

Table 4: AI readiness framework across key infrastructure and governance domains in K-12 education

Area	Definition	Existing efforts	Opportunity
Network & Devices	Reliable school connectivity, classroom Wi-Fi, and access to learning devices.	National connectivity is strong , but AI adoption hinges on connectivity at the school level, and ability to subscribe to AI tools	Match school connectivity classifications with AI capabilities and use cases to enable higher adoption.
Identity, Access & Data foundation	Single Sign-On (SSO), secure access, data governance, and privacy-by-design for education ecosystem data.	MoE is leveraging Nafath for strong authentication and PDPL ³⁹ for legal identification.	Develop an education-specific DPIA Template for AI use in classrooms under PDPL.
Safety & Cybersecurity	Sector-wide controls to keep students safe (access control, content filtering, audit logs, incident response).	The National Cybersecurity Authority (NCA) publishes a wide range of "Cybersecurity Controls" as a baseline for public entities.	Issue an "AI in Schools Security Profile" aligned with NCA standards. A checklist of security guidelines to deploy AI tools in schools
Interoperability & Standards	Technical standards that enable AI tools to plug into national platforms without custom build.	None publicly found.	Launch the Saudi EdTech Interoperability Profile for K-12 for tools integration ⁴⁰ .
Inclusion & Accessibility	Ensuring that tools, content, and networks are inclusive for learners with disabilities and accessible in rural areas.	The process was established from the digital infrastructure in response to COVID-19.	Add accessibility conformance criteria to any AI tool procurement requirements ⁴¹ .
Research & Piloting	Safe environment and methodologies to continuously test and pilot AI tools before scaling (e.g., Sandbox, applied research).	NeLC has launched an AI Sandbox and MoE Sandbox initiative is in progress—creating a bridge from pilots to policy.	Institutionalize a "Research–Sandbox–Policy" pipeline, where continuous research feeds systematic evidence into policy formation and decision-making.

³⁸SDAIA Personal Data Protection Law

³⁹Learning Tools Interoperability Core Specification 1.3 | IMS Global Learning Consortium

⁴⁰Enhancing Accessibility through 1EdTech Standards | 1EdTech

CASE STUDY

Noon Academy—A Scalable Model for Next Generation Learning

In many parts of Saudi Arabia, students still struggle to access experienced teachers, especially in smaller towns or rural areas. Noon Academy has been experimenting with a hybrid model that helps to bridge this gap. In practice, a subject expert teaches remotely, while a facilitator is present in the classroom to manage students and keep lessons interactive. With the help of digital platforms and AI tools, one teacher can reach several classrooms at the same time.

This approach matters because it tackles a long-standing issue: unequal access to quality teaching. Parents are kept involved through automated weekly updates on student progress, and the model has shown that students in different regions can benefit from the same level of instruction without overburdening the system with additional staffing needs.



⁴¹SDAIA Personal Data Protection Law

⁴²Learning Tools Interoperability Core Specification 1.3 | IMS Global Learning Consortium

⁴³Enhancing Accessibility through 1EdTech Standards | 1EdTech



4. Governance & Policy

1. Build policies based on a set of core values that define the journey of education

- I. Align with established values of education
- II. Answer all questions within eight areas in compliance with values
- III. Develop rules based on answers
- IV. Test rules in safe environments
- V. Optimize rules

Establishing strong technology governance is essential to maintaining the integrity of learning and sustaining trust among stakeholders. Saudi Arabia's advanced governance and regulatory framework under the leadership of SDAIA provides the foundation for responsible AI adoption across sectors. The **most effective policies are those grounded in a clear value-anchored system similar to the values put forward by the Ministry of Education** that reflects what the education system fundamentally cares about.

In light of rapid technological development, policies should be iteratively refined through controlled testing to examine what works and what does not. The MIT RAISE initiative highlights **eight areas of education requiring dedicated policy attention**⁴² (see Figure 7): Academic Integrity, Augmented Teaching, AI Literacy, Data Privacy, Teacher Use of AI, Efficacy of Tools, Funding, and Auditing AI Models. Together, these areas form the foundation for a comprehensive and trustworthy AI policy framework in education.

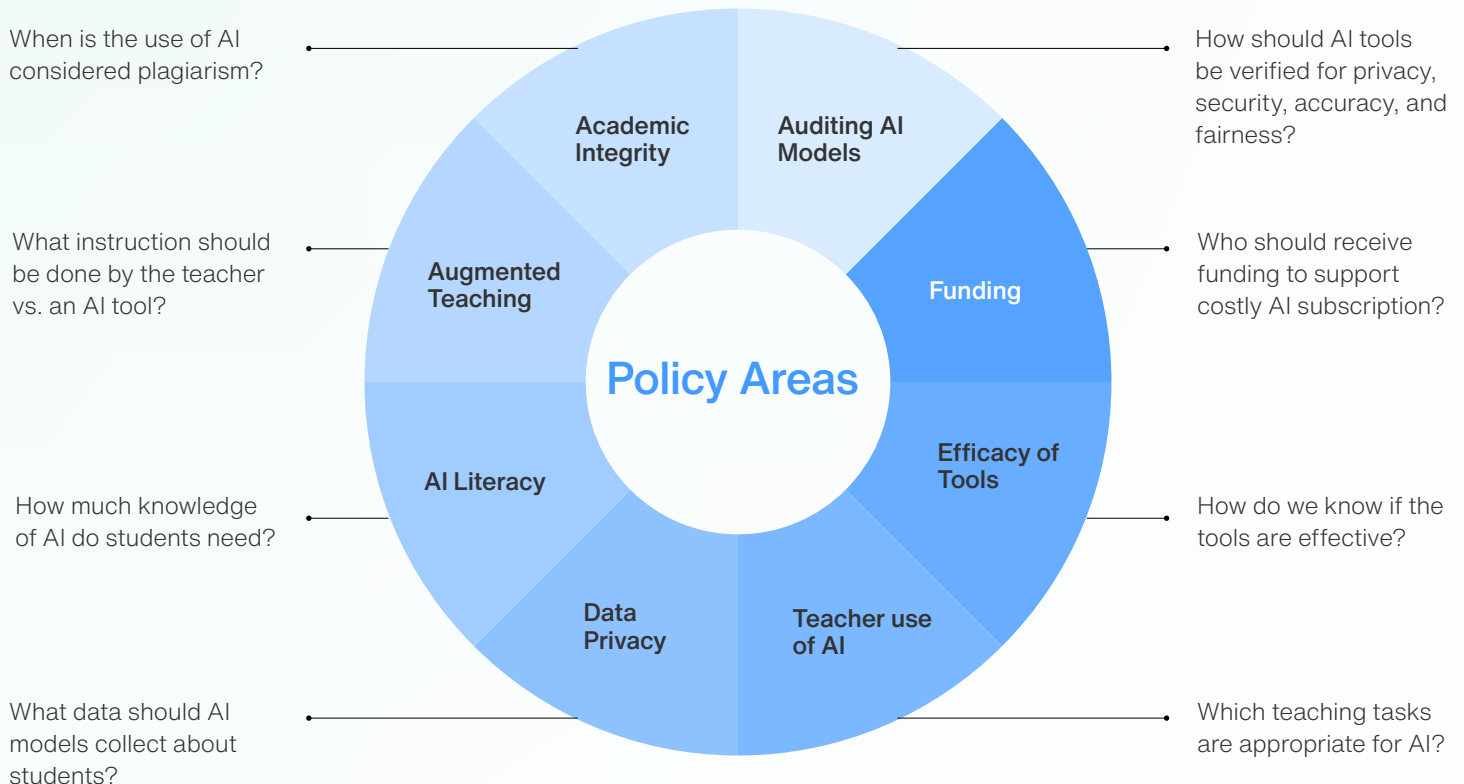


Figure 7: Interconnected AI policy areas including privacy, integrity, funding, and efficacy shape responsible AI use in education.

⁴⁴Day of AI Global Summit in Dubai | MIT RAISE (2025).

A clear governance framework for AI technology ensures that innovation is guided by responsibility and ethics to prevent uneven practices and greater uncertainty. Here, we outline **lessons learned to advance technology governance** in alignment with global standards of ethics, accountability, and trustworthy AI in education. These governance mechanisms support implementation across the eight policy areas outlined above, ensuring consistent oversight, evaluation, and monitoring of AI use in education.

1. Establish a centralized oversight and accountability system

Challenge: No clear escalation path when AI risks or misuse occur in classrooms, and fragmented responsibilities across teachers, school administration, and education authorities.

Solution: Establish a central oversight policy with a chain of responsibilities (from classroom to school principal to region administration to national ministry) that combines monitoring, complaint handling, and audits. Appoint an AI safety lead⁴⁵ at the regional level to provide consultations and remediation metrics for misuse cases and reports to a central steering committee for coordinated actions. This structure supports governance across policy areas such as academic integrity, teacher use of AI, and responsible classroom adoption.

Example: The Framework for GenAI in Schools (2023) from Australia illustrates this by assigning responsibilities across jurisdictions. As well as Singapore's EdTech Masterplan reinforces the model through ministry-led oversight, dedicated technology officers, and clear escalation routes.⁴⁴

Recommendation: Designate

an AI safety lead at regional level to log and audit misuse incidents reporting to a central steering committee.

2. Implement an evaluation framework for AI tools

Challenge: Teachers pick "trendy" GenAI tools without benchmarking for privacy, accuracy, or safety, pedagogical value, and alignment with curriculum standards.

Solution: Integrate the DGA national evaluation process⁴⁵ to endorse AI tools in education. For transparency, maintain a public registry of tools and evaluation scores. **Example:** South Korea reviews and endorses digital learning platforms such as digital textbooks to ensure consistent educational standards.⁴⁶

Recommendation: Mandate the classification and evaluation of AI tools eligible for the education ecosystem.

3. Establish a continuous tracking and monitoring system for AI use in education

Challenge: The need for consistent metrics to assess the risks and benefits of AI over the years.

Solution: Establish a pilot-to-scale pipeline to have feedback loops informing policy adjustments. Complemented with a comprehensive Key Performance Indicator (KPI) set prior to AI deployment. The KPIs focus on learning gains, bias detection, accessibility, equity of access, academic integrity, and long-term socio-emotional impacts.

Example: Current NeLC AI Sandbox in Education environment achieves an independent evaluation of potential tools.

Recommendation: All AI deployments must follow a common KPI set for measurement standardization.

2. Strategic governance mechanisms supporting all policy areas:

- I. Oversight: Each school to designate an AI safety lead to log incidents and oversee responsible AI use across policy areas such as academic integrity, data privacy, and teacher use of AI
- II. Evaluate: Classification and systematic evaluation of AI tools and policies eligible for education ecosystem
- III. Monitor: AI deployments must follow a common KPI set for measurement standardization

⁴⁵This could be new positions or additional tasks to existing positions. it is based on what the administration sees suitable for achieving the goal which is monitoring and oversight.

⁴⁶EdTech Masterplan. Ministry of Education Singapore. (September 6, 2025).

⁴⁷Services | Digital Government Authority

⁴⁸World Bank, Teachers are leading an AI revolution in Korean classrooms



5. Ethics

The educational system's commitment to safe and responsible AI adoption is demonstrated through established national guidelines and frameworks already in place, positioning Saudi Arabia as one of the earliest countries to provide systematic ethical guidance for schools.

Teachers, parents, and students are not passive recipients of AI applications; their understanding and ethical reasoning will shape how technology is embraced. Raising awareness and

implementing ethics-by-design grounded in the frameworks and principles already established Saudi Arabia is preparing students and teachers to navigate and shape the technologies that defines their future. This approach is critical to complementing national policies put forward by SDAIA. In Table 5 we apply SDAIA's Seven AI ethics principles⁴⁷ to **outline how education-specific risks can be addressed within this established ethical framework.**

Table 5: Key AI ethics principles with risks and mitigating factors

Ethical principal		Relevant risks	Mitigating factors
1	Fairness	— Distorted outcomes from biased data	→ Integrating local Arabic-based LLM models, designed to understand cultural context better suited for national educational platforms.
		— Unfair decision due to discrimination	→ Prioritize support to under-resourced schools first
		— Marginalizing identity due to cultural biases	→ Develop a mechanism to protect individuals who might be disproportionately affected by negative implications because of AI
		— Unequal access to AI	
2	Privacy & Security	— Misuse or leakage of student data	→ Apply a privacy-by-design approach to all AI tools: limit data to what is necessary, embed data masking mechanisms
		— The use of insecure AI platforms	→ Require independent security testing and privacy impact assessment of AI tools
3	Humanity	— Manipulation of thinking or deception	→ Teach students about inherent human dignity
		— Misalignment with KSA cultural values and human rights	→ Maintain a human approach for learning decisions
			→ Require human governance and oversight
4	Social & Environmental Benefits	— AI reinforcing social inequality	→ Require AI initiatives to articulate their social benefits and link AI to socially recognized ends
5	Reliability & Safety	— System failures and unexpected cybersecurity scenarios	→ Adopt SDAIA's guidance on continuous monitoring and disaster recovery plan for the educational platforms
6	Transparency & Explainability	— End users not aware they are interacting with AI	→ Mandatory AI disclosure when including chatbots and provide an option to opt-out
		— Missing logs/documentation and performance	→ Auditability and log requirements for learning decisions, especially for admission, progression and certification decisions
7	Accountability & Responsibility	— Authorization & responsibilities not clearly assigned	→ Defines responsibilities and autonomy of national platforms and the school principal (e.g., SDAIA accountability structure)
		— Inability for students and parents to sort out AI complains	→ Create clear appeal routes and timelines for AI risks and misuse

⁴⁹SDAIA AI Principles

Building on these ethics' principles, a global benchmark shows that ethical AI requires societal education and cultural preparedness. Korea sets a strong example to make sure students internalize ethical reasoning from an early age. Korea's framework adds dimensions such as

respect for diversity, doing no harm, common good for society, strengthening solidarity, and taking responsibility.⁴⁸ These ethics were built on a set of values including safety, reliability, and trustworthy⁴⁹, reflecting on a holistic view of how AI should operate within a diverse society.

CASE STUDY

Korea's AI Ethics Communication Channel

Korea demonstrates a clear approach to enforcing AI ethics on a societal level through education and public communication. Their model is built on three integrated levels: 1) provision of national guidelines for AI ethics, 2) Developing a general-purpose AI ethics self-checklist for individuals to examine their adherence to the guidelines, 3) Developing a field tailored AI ethics self-checklist for specialists featuring selected questions handling emerging issues.

Korea continuously updates these checklists to reflect new technologies and risks, ensuring the framework evolves in step with innovation. This multi-layered, adaptive approach allows ethical standards to be communicated clearly across society while providing practical tools that translate national values into actionable behaviours in the classroom, workplace, and public services.



⁵⁰AI Ethics Textbook for K-12 Students | AI Ethics Education

⁵¹South Korea AI law

Path Forward

The integration of GenAI in the education system builds on Saudi Arabia digital transformation and AI strategy in education. The Ministry of Education's achievements including AI curriculum, published guidelines, teacher training demonstrate that transformation is set in motion. These advancements leverage GenAI to enhance personalized learning pathways and shift assessment from final products to the learning process.

Alongside these efforts, additional components are needed to preserve higher-order learning objectives. Guidelines must be translated into practical tools, checklists, prompt library, and safe use cases that teachers can actually use in everyday planning. All this must sit in a culture of digital safety, where students learn about AI and with AI.

To deliver this promise, Saudi Arabia is investing where it matters most. As transformation begins with minds, the national programs are built to equip teachers with skills to navigate the latest trends as they are advancing. **Shifting the assessment methodologies to assess the learning process allows teachers to adopt AI while balancing literacy with rigorous learnings**. A coordinated roadmap is being built to empower teachers and ensure equitable reach, and create clear pathways for professorial growth with AI. A first phase focuses on diagnosing where teachers stand, combining standardized placement tests to establish a national baseline with school-level assessments by principals who know their teachers best. The second phase selects the right delivery models: blended pathways that mix in-person coaching for applied competencies with synchronous and asynchronous modules for basic literacy. The third phase scales this effort through regional train-the-trainer programs and targeted incentives that reward deep expertise, peer support, and innovation in classroom practice. In other words, the system must move from ad-hoc workshops to a structured, multi-year capability ladder.

These human capabilities are supported by **end-to-end, AI-ready infrastructure** through Vision 2030 investments and national initiatives. The opportunities ahead involve optimizing and coordinating the existing infrastructure across sectors, including the education sector, would provide a solid core for connectivity. Coordinating

these systems will enable safe experimentation and evidence generation for scaled adoption.

None of this can succeed without clear value-anchored policy foundation. **The path forward begins with core values for the educational journey** that applies to all stakeholders, then building policies that ensures long-term coherence. The governance model defines explicit roles and responsibilities across the system to safeguard consistency and accountability. Having a designated AI safety responsible at regional level to log incidents, audit misuse, and act as a first line of escalation reporting to an overseeing steering committee to ensure policies are implemented. Over time, a common KPI framework for AI deployments will allow the education ecosystem to compare initiatives, retire ineffective ones, and scale those that demonstrably improve learning, equity, or efficiency. Governance, in this sense, is not about slowing innovation, but about channelling it towards outcomes that truly aligns with the educational goals.

Finally, incorporating **ethics-by-design** into every layer of practice is crucial for implementing educational strategies that align with cultural and national priorities as done with the GenAI Guidelines for education stakeholder. Anticipating and addressing ethical risks through a combined approach that integrates local and global AI ethics frameworks highlights the importance of fostering an understanding of AI ethics from an early age. This will enable individuals to adopt AI confidently and responsibly.

Taken together, these recommendations point to a future in which Saudi Arabia is able to orchestrate the integration of technology in the classroom as part of a broader transition to Education 4.0. The path forward is iterative: diagnose, pilot, evaluate, scale, and refine. It is also collaborative: ministries, regulators, universities, EdTech firms, teachers, and communities each hold part of the solution. If governance is strong and trust is maintained, AI can help the education system move from one-size-fits-all instruction to responsive, data-informed learning journeys to prepare a generation that is not only AI-enabled, but also ethically grounded.

Authors

Reem Taibah
Project Lead

Laila Alqahtani
Project Fellow

Noor Almazroa
Project Fellow

Amani Alolayani
Project Fellow

Adnan Alsaati
Project Advisor

Acknowledgements

Sincere appreciation is extended to the following community members, who participated in workshops and provided critical input and

feedback on the drafts. Their diverse insights are fundamental to the success of this work.

Dalal Alabbasi

Director, Educational Development - Jeddah Development Authority

Husa Alangari

General Manager and CEO, Ultimate Learning Academy KSA

Nariman Ali Alawami

Instructional Methods Specialist – Ministry of Education

Saja Al-buraik

Consultant - Ministry of Education

Fahad Alenezi

Director, The Knowledge Excellence Department – National e-Learning Center

Abdulrahman Alhabaidi

B2B Director – Noon Academy

Hana Alhomrani

Director, Analysis and Program Planning Department – National Institute for Educational Professional Development

Majid Almaraashi

Consultant - Ministry of Education and Associate Professor of Artificial Intelligence

Nora Almuhanha

General Manager, e-learning and Distance Education – Ministry of Education

Meznah Almutairy

AI Consultant, Capability Building – Saudi Data & AI Authority

Najla Altwaijry

General Manager, Education Sector – Saudi Data & AI Authority

Areej Alwabel

Director, The AI Center, and Faculty, College of Engineering – Alfaisal University

Agustina Callegari

Project Lead, Global Coalition for Digital Safety – World Economic Forum

David Edwards

Director General for Education, Research and Innovation – Neom

Yahya Ghazwani

Educator

Abdulrahman Habib

Managing Director –The International Center for Artificial Intelligence Research and Ethics

Abdullah Alhantoush

Assistant Minister of Education for Development and Transformation' Advisor & Leader of AI - Ministry of Education

Mounira Jamjoom

Founder of Aanaab, Partner at PwC Middle East

List of Figures

Figure 1	Teachers' perceptions of AI's impact and concerns	8
Figure 2	National Training Programs for teachers with reported participations (2025)	18
Figure 3	Teachers' Training Interest vs. Cost Willingness	19
Figure 4	NeLC Competencies for using AI in digital learning	20
Figure 5	Teachers' self-reported GenAI capabilities	20
Figure 6	Teachers self-reported preferred methods of upskilling	22
Figure 7	Interconnected AI Policy areas drive responsible AI use in education	27

List of Tables

Table 1	The AI Assessment Scale (AIAS) (2025 Mike Perkins, Leon Furze, Jasper Roe, Jason MacVaugh)	16
Table 2	Structured incentive program based on their competency and contribution	24
Table 3	AI readiness framework across key infrastructure and governance domains in K-12 education	26
Table 4	Key AI ethics principles with risks and mitigating factors	29

References

(2023)	AI Ethics Principles. Saudi Data and AI Authority.
(2025)	Artificial Intelligence and Digital Learning: transformation perspective and roadmap. National eLearning Center.
(2025)	Competencies For Using AI in Digital Learning. National eLearning Center.
(2023)	Defining Education 4.0: A Taxonomy for the Future of Learning. World Economic Forum.
(2023)	Guidance for generative AI in education and research. UNESCO.
(2025)	Guideline for Using Generative Artificial Intelligence in General Education. Saudi Data & AI Authority, Ministry of Education.
(2025)	Human-Centered AI. Digital Government Authority.
(2022)	K-12 eLearning Framework. National eLearning Center.
(2022)	LMS Framework. National eLearning Center.
(2020)	National Data Governance Policies. Saudi Data & AI Authority.
(2023)	National Framework for Artificial Intelligence in Digital Learning in Kingdom of Saudi Arabia (AIDL) National eLearning Center.
(n.d.)	Regulations and Guidelines for the Use of GenAI Tools and Applications in Digital Learning. National eLearning Center.
(2024)	Saudi Arabia Artificial Intelligence Readiness Assessment Report. UNESCO.
(2024)	Shaping the Future of Learning: The Role of AI in Education 4.0. World Economic Forum.
(2020)	Trustworthy AI in Education: Promises and Challenges. Riyadh: OECD.

Appendix

Appendix 1

Benchmark scoring system. Data collected up to 2025.

Score	Stage	Definition
1	No evidence	No literature or public news about a relevant initiative
2	Early Exploration	The existence of news and first steps of a relevant initiative without any implementation
3	Pilot Stage	The existence of small-scale initiatives from the private sector as pilot program
4	Partial Implementation	Existence of a small-scale national program with partial implementation
5	Full-Scale Implementation	The implementation of a program at full-scale for k-12

Pillar: Ethics

Metric	Saudi Arabia	UAE	USA	Australia	Poland	Singapore	South Korea
Existence of AI ethics framework	National Framework & Guidelines on ethical principles in Education 3	National Principles & Guidelines (implemented in AI guidelines) 4	Federal AI Principles 4	National ethics principles with AI/IT ethics 4	National AI Guide for Teachers 4	National Framework with governance in Education 4	Ethics guidelines implemented in education 5
Research policies	Recommended 2	Explicit statements on AI ethics principles 3	Recommendation of research policies and supervision 3	Mention of ethics within e-learning and higher education 2	Recommended 2	No Evidence 2	Recommended with mention in guidelines 1
Data privacy enforcement	Under PDPL 3	Adds onto NDM AI principles 4	Under FERPA & student data protection 4	Addressed in AI Ethics principles 3	Aligned with EU Data Regulation 3	Under PDPC 4	Taught under Ethics guidelines & data responsibility 4
Child-centric AI design	No evidence 1	AI centered from kindergarten 3	Recommended 2	Recommended 2	AI guide designed for children 3	Recommended 2	Available ethics materials for elementary students 5
Transparency & explainability	Piloted through Strategy for AI 3	Explicitly addressed and published on national resources 5	Regulatory guidance for transparency 4	National guidelines on transparency 4	Principles & guidelines specific to teachers 3	National guidelines 4	Ethical principles implemented in curriculum 5

1 No Evidence **2** Early Exploration **3** Piloting **4** Partial implementation **5** Full scale implementation

Pillar: Governance & Policy

Saudi Arabia	Saudi Arabia	UAE	USA	Australia	Finland	Singapore	South Korea
National AI-in-Education Strategy	Priority sector part of the National Strategy for Data & AI	3 AI Strategy 2031	3 Federal instructions for AI integration in education	5 Artificial Intelligence in Education (AIEd) Framework	4 AI strategy report focuses on Human Capital	4 EdTech Master Plan 2030	5 National initiative for personalizing education using AI 2023
Cross-ministerial coordination	Mainly Public coordination	3 National coordination on strategy	4 At state level	3 Multi stakeholder coordination Public-Private-consultations-Research	4 Multiple stakeholders on framework	4 Collaboration between multiple ministries and agencies	5 Implication of coordination through initiatives
Stakeholder inclusion mechanisms	In form of consultations with teachers, experts	2 No evidence	1 At state level	3 In form of consultation with unions, teachers, students, industry, academics and parents	5 MoE supports the cooperation of all stakeholders	2 Consultations with public - AI policymakers	5 Consultations with civic groups
Alignment with international standards	Aligned	5 Aligned	5 Aligned	5 Aligned	5 Aligned	5 Aligned	5 Aligned

1 No Evidence 2 Early Exploration 3 Piloting 4 Partial implementation 5 Full scale implementation

Pillar: Infrastructure & Accessibility

Metric	Saudi Arabia	UAE	USA	Australia	Finland	Singapore	South Korea
EdTech interoperability standards	Mandated digital infrastructure under Vision 2030	Digital Data Interoperability Framework and the "API-First Policy"	National recommendations	National Product Expectations project (2024–26)	Digitalization policy covers standards	International operability standards imparted in SLS platform	Under "EdTech Promotion Act"
AI tool procurement guidelines	National guideline and standards, but no procurement guidelines published	Early exploration of AI guidance through MoE	Federal laws on AI use and Procurement	ESA strategy sets procurement standards	Education providers have the ability to make procurements and maintain a secure digital operating environment	Subject to Model AI Governance Framework	National procurement frameworks and legal enforcement from 2026
Devices & connectivity equity	Madrasati digital equity program	Digital learning equity	Connectivity gap closing	Fairness principle in framework	Digital Education initiatives	Student Learning Space (SLS)	Digital inclusion efforts
Inclusion of rural & marginalized	Rural inclusion initiative	Digital Strategy focuses on inclusion	At state level	Considered in implementation	Equity focus in policies	Inclusion is a priority	Partial implementation on national level

1 No Evidence 2 Early Exploration 3 Piloting 4 Partial implementation 5 Full scale implementation

Pillar: Capability Building

Metric	Saudi Arabia	UAE	USA	Australia	Finland	Singapore	South Korea
Mandatory AI PD programme	About 17% of teachers have been trained in 2025	3 8% of teachers to have AI training in 2025	3 National priority for lifelong learning resources for teachers	4 Multiple optional nationwide programmes	4 EDUFI's AI Guide for Teachers is a national resource	4 Plans of acceleration by Minister of Education	3 Almost train 300,000 teachers by 2026 including 34,000 "Leading Teachers"
Pre-service AI training	4 Launched AI chapter in pre-service training curriculum	3 Teacher training in form of workshop	4 26% of teacher colleges embed AI training	4 At least three graduate AI teacher courses	3 AI literacy teacher training in form of workshops	3 Gradually being integrated into NE teacher education curricula and university-level programs	5 Seoul National University College of Education has launched Department of AI-Integrated Education
Teacher training in form of workshop	4 Elective webinars, workshops, and professional certificates	2 Few structured credentials	2 Being developed at state level	3 Tiered graduate courses & certifications	1 No evidence	3 National micro-certifications	4 Professional certifications
Time and funding incentives	3 Teachers receive training credit hours that counts in their promotion	3 The top 10 teachers with innovative AI classroom practices are awarded at Dubai's AI Retreat, sharing a prize pool of AED 1 million	3 Official task force to improve AI education	2 Allocated AU\$30M toward easing teacher burden through AI	2 Recommended to provide incentives	1 No evidence	5 Ministry of Education is investing US\$1 billion in this educational solution
Teacher involvement in design	4 Contributed in building programs for teachers, and revised the student AI curriculum	4 Tested the UAE curricula	5 Encourages the involvement of all stakeholders/teachers	5 Teacher collaboration in EdChat & AI curriculum design	1 No evidence	4 Teachers involved in policy, pedagogy, and implementation	5 Teacher co-authored AI ethics curriculum with researchers

1 No Evidence 2 Early Exploration 3 Piloting 4 Partial implementation 5 Full scale implementation

Pillar: Teaching & Learning

Metric	Saudi Arabia	UAE	USA	Australia	Finland	Singapore	South Korea
Curricula integration	3 Elective from 4-12	4 Mandatory K-12	4 At state level	4 Embedded AI curriculum in all subjects	5 Standalone AI curricula being piloted	3 Full rollout started June 2023	5 AI curricula implemented across K-12, plan to introduce AI digital textbooks in select subjects from 2025
Access to AI learning tools	3 Microsoft tools via Madrasati	3 AI & Education platform	4 44% of schools using GenAI	4 Custom-built EdChat chatbot	4 National digital tools	4 Multiple tools deployed nationally	5 National digital textbook in 2025
AI-powered assessment	2 On teacher effort	3 Plans to pilot AI-enhanced assessments	4 72% already using an AI tool	3 Guided AI-based assessment tools (Score 2)	3 Teacher-guided experimentation	4 National testing integration planned	4 AI-powered assessment is available in classrooms using AI textbooks
Alignment with workforce skills	4 Vision 2030 alignment	4 UAE National Strategy for Artificial Intelligence 2031	4 A federal task force has formed to implement AI based on future labor demand to advance AI in America	4 Framework aligns with labor market needs	4 Closely aligns AI-related competency standards with labor market needs	4 AI competency framework that align with labor market needs via "SkillsFuture" and TAEI 2.0	5 Vision for an AI-driven economy by 2030

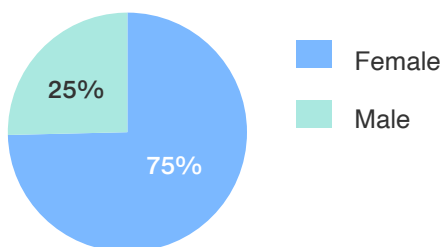
1 No Evidence 2 Early Exploration 3 Piloting 4 Partial implementation 5 Full scale implementation

Appendix 2

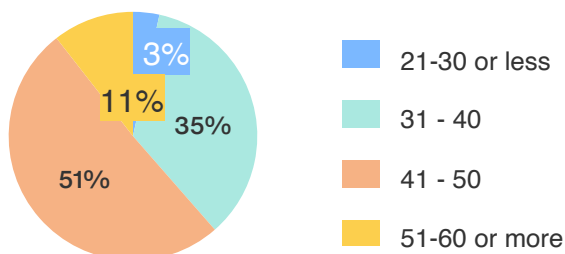
National Teachers Survey on GenAI readiness in Education Response profile:

- The national survey was conducted with **44,920 K-12 teachers across Saudi Arabia** to assess their awareness and use of GenAI in the educational context.
- The survey was distributed in **August 2025** by the Ministry of Education, administered online in Arabic, and remained open for 10 days, ensuring broad reach and accessibility.
- The respondent group includes teachers segmented by gender, age, school level, years of experience, region, and subject taught, offering a comprehensive view of perspectives across the education system.
- While sizable, the **sample represents 8.8% of all teachers in the Kingdom** (based on 2024 national counts), providing a meaningful yet non-exhaustive snapshot of the national teaching workforce

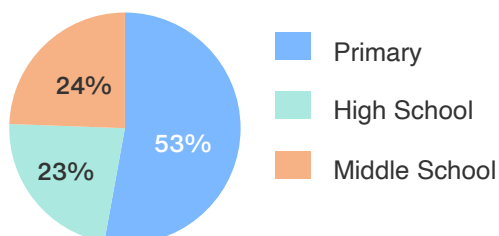
Gender



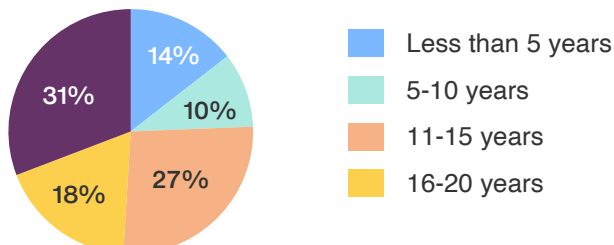
Age



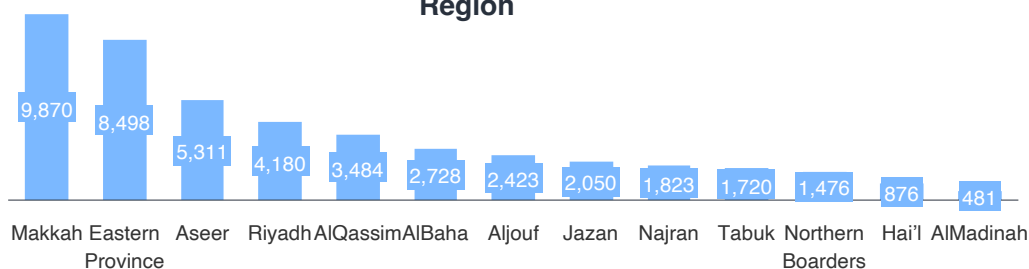
School level



Years of experience



Region



Subject Taught

