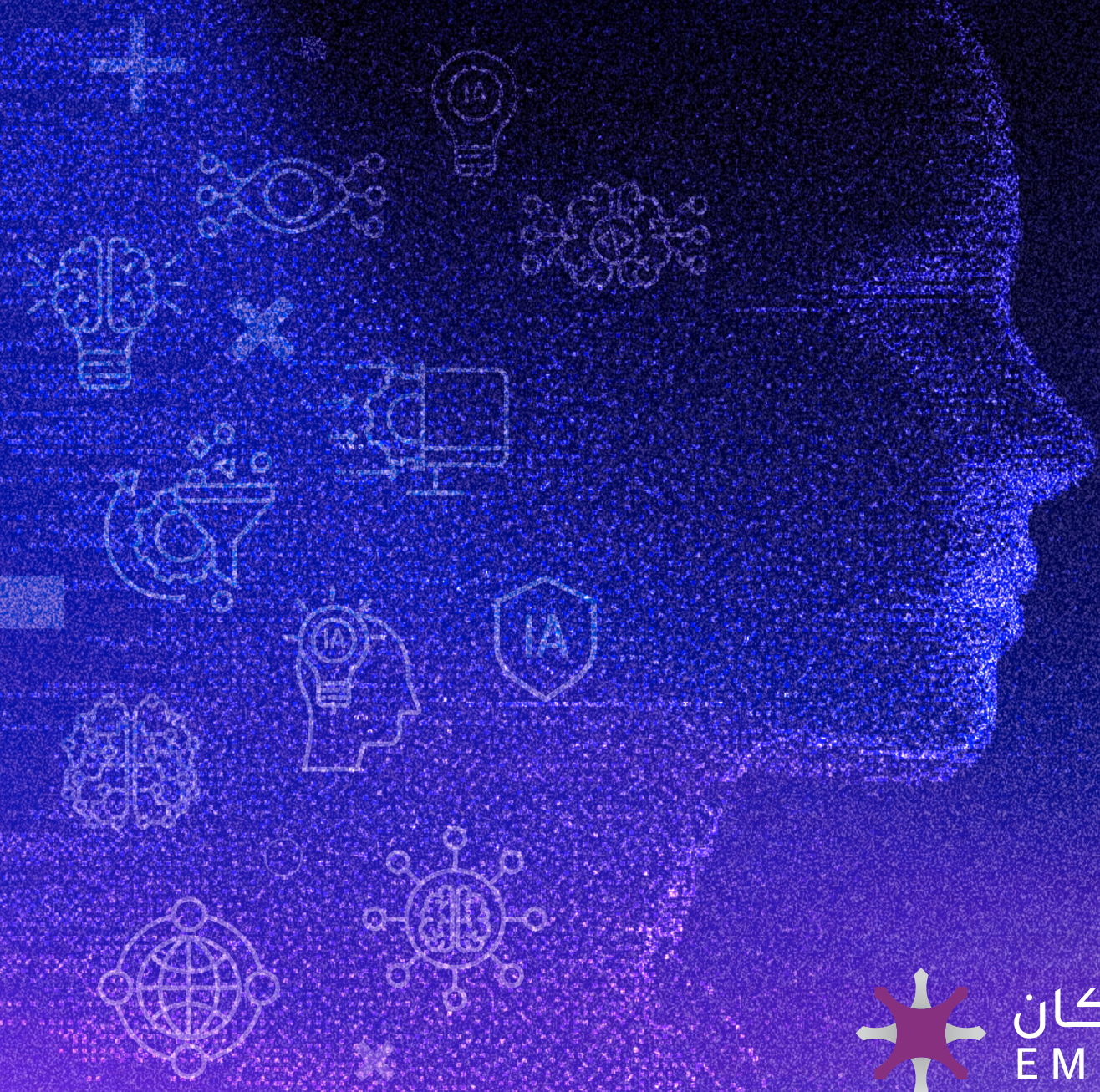
January 2024

AI IN EDUCATION:

Navigating from Policy to Practice for a Future-Ready KSA



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CONTENT

1. INTRODUCTION

In the ever-evolving landscape of education, the integration of Artificial Intelligence (AI) stands as the beacon of transformative potential. As we navigate the complexities of preparing today's learners for the challenges of tomorrow, AI emerges, promising innovative solutions to enhance K-12 education. The fusion of cutting-edge technology with pedagogical practices has the potential to revolutionize the way students engage with learning, offering personalized experiences, data-driven insights, and adaptive methodologies.

Nevertheless, as we embark on this journey into the AI driven educational frontier, we must simultaneously navigate a landscape marked by challenges, ethical considerations, and the compulsion to ensure meaningful access for all, especially in consideration of the Kingdom of Saudi Arabia (KSA) local educational landscape.

AS KSA STRIVES TO PREPARE ITS STUDENTS FOR A RAPIDLY CHANGING GLOBAL LANDSCAPE, HOW CAN AI BE LEVERAGED NOT JUST AS A TOOL FOR ENHANCING EDUCATIONAL PRACTICES, BUT AS A CATALYST FOR TRANSFORMATIVE CHANGE THAT EQUIPS KSA STUDENTS TO BE FUTURE-READY AND GLOBALLY COMPETITIVE?

2. NAVIGATING THROUGH THE LITERARY LANDSCAPE OF AI IN EDUCATION

AI is rewriting the script of educational technology as we know it today, sparking a revolutionary wave of inquiry, advancement and change. As AI reshapes teaching dynamics, instructional techniques, and assessment processes, both educators and researchers are delving into studies to uncover impactful ways of integrating AI into the educational landscape. In pursuit of a comprehensive understanding that will inform our next steps in development, our initial focus involves an examination of the insights articulated by international educational experts on this matter. Spanning from the ability of AI to customize learning experiences to the ethical dilemmas of AI decision making, the spectrum of research uncovers a range of concepts and obstacles. This summary aims to bring together where the current literature stands, from lessons learned and pervasive questions still being faced on the integration of AI in education. As we explore this, we want to capture all the different views that help us understand how AI and education work together in Saudi Arabia.

Scholars anticipate that the advent of AI will bring about significant and inevitable changes. Given the integration of social media into our daily routines and the swift dissemination of information about AI, it is inevitable that individuals in the Kingdom of Saudi Arabia, including school leaders, teachers, and students, will become cognizant of its potential. However, this awareness may come with a certain level of distortion. This is because there is an inherent bias stemming from algorithmically driven content on social media platforms.

Researchers highlight that the **major challenges related to AI in education are grouped into two main areas** (Lane, 2023). The first concern focuses on ethical concerns such as; the protection of privacy, which is paramount to prevent data breaches and unauthorized access to sensitive information. Another ethical aspect is the potential for biases within AI systems, which may compromise the reliability of assessments and influence and could affect their reliability and how giving too much autonomy to AI might impact students' motivation and engagement. The second area focuses on teachers, highlighting the need for effective professional development programs. These programs should equip teachers to incorporate AI into their teaching methods without students becoming overly dependent on technology. The views expressed in the literature around the challenges of incorporating AI into education generally align with the current perspectives of citizens in the Kingdom of Saudi Arabia regarding the use of AI in education. Nevertheless, existing research offers various solutions to tackle these predicaments.

A TOOL FOR PLAGIARISM OR STUDENT ASSISTED LEARNING?

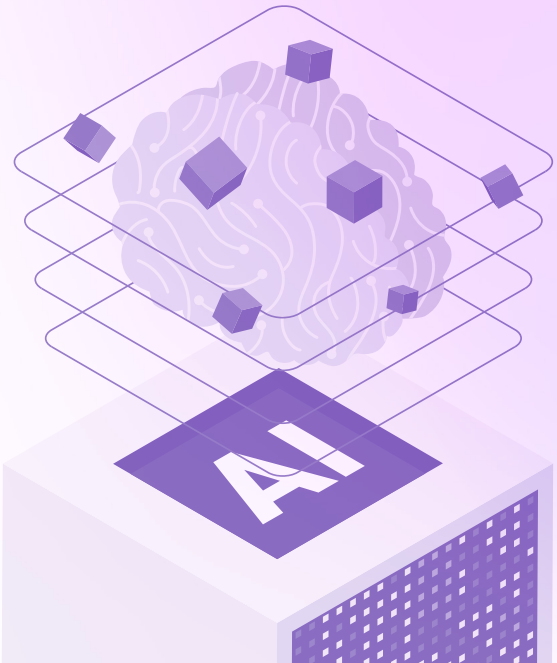
REDEFINE AI AS YOUR ALLY

The core issue at hand is the ethical use of education shared by school leaders and teachers in KSA. There is widespread apprehension that students might misuse AI tools like **ChatGPT** and **Bard**. This misuse could lead to problems such as excessive dependence, plagiarism, and a general deficiency in essential developmental skills among learners, such as critical thinking and assessment abilities. Nevertheless, literature presents a two-fold solution to this issue, with the initial aspect emphasizing learning about AI, followed by a progression towards instructing students on how to use AI.

Learning about AI involves helping students comprehend and manage AI, attempting to reposition the role of AI in student lives. This approach advocates for an early start, assessing what children already know about AI. What could be revealed in this instance, is that students may struggle to distinguish between programmed actions and experiential learning. In this scenario, teachers play a crucial role in assuming control over AI and clarifying that the appearance of intelligence does not guarantee actual intelligence. An effective method employed is '**glass box learning**,' where teachers reveal the inner workings of the system. This approach could include teaching the four types of AI (e.g., Self-Aware AI, Limited Memory AI) and how they rely on pre-programmed information. Explaining how AI functions helps mitigate risks such as plagiarism and excessive dependence, guiding learners to make informed choices and exercise discernment in their readings.

AI: CHAMPIONING COLLABORATION OVER DEPENDENCE

Using AI in education means giving students hands-on experience with AI tools and platforms. Hands-on experience allows students to apply theoretical knowledge to real-world scenarios. **It bridges the gap between theoretical understanding and practical implementation**, enabling them to grasp the intricacies of AI concepts more effectively. In addition to this, engaging in hands-on AI projects helps students develop practical skills essential for working with AI technologies (Lane, 2023). This includes programming, data analysis, problem-solving, and critical thinking skills. Using AI in education enables the student to branch beyond tools such as ChatGPT to include other AI tools, such as Google Translate or Duolingo (Wang, 2023). The best way to use AI in education is to customize lessons based on what each student needs (Touretzky, 2019). In fact, learners in KSA have highlighted that



adaptive learning is a key opportunity they see for AI to be integrated into the education system, alongside finding real world applications. That means making sure AI lessons are not just available but are also right for each student's stage of learning.

EMPOWER STUDENTS WITH AI: TAILORED LEARNING FOR SUCCESS!

In the second area of focus, a significant challenge often linked to the creation of professional development programs for delivering AI-integrated learning methods is the prevalent perception that understanding AI requires a Computer Science degree, making it seem highly complex. However, the literature argues that this perception is unfounded (Lane, 2023). To address teachers' reluctance to participate in and develop professional development programs, and really simplify the image of AI and its use in education, the literature suggests that these programs should concentrate on teaching basic ideas crucial for understanding AI in the future, rather than delving into the complexities of AI itself (Lane, 2023). Emphasizing the practical side, including how to convey AI-integrated learning and the ability to critically analyze information, is key. The goal is to view AI as a facilitator, not an initiator, to alleviate fears and encourage participation.

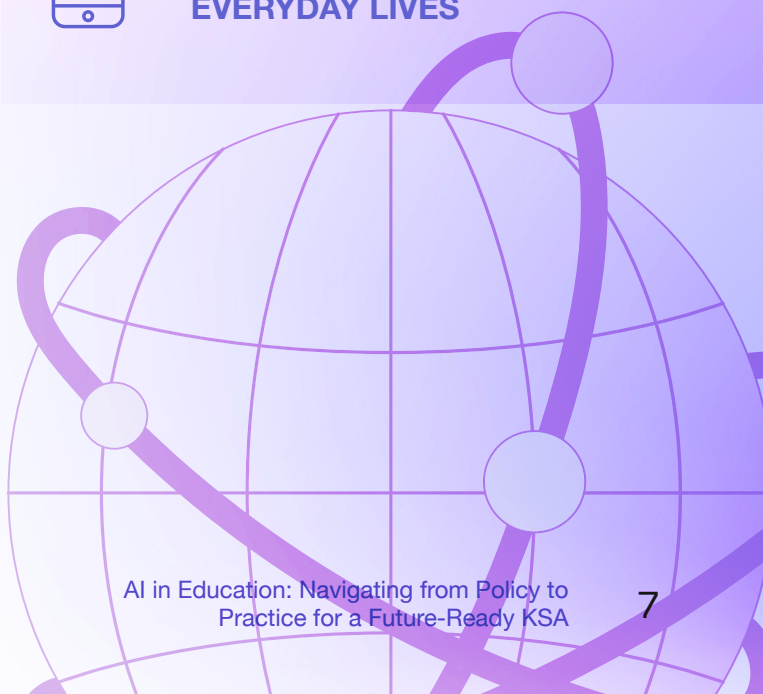
3. UNVEILING THE CURRENT LANDSCAPE OF AI INTEGRATION IN EDUCATION

AI Integrated Education Global Initiatives Shaping the Future of Education

In the fascinating world of AI in education, a notable global trend is unfolding as governments worldwide place a strong emphasis on the **ethical use of AI**, collectively ensuring its positive impact on education. Countries on the global stage, including the United States of America (USA), China, and Australia, have undertaken initiatives to advance AI education, aligning with a vision for a future that is increasingly facilitated by AI.

The USA has promulgated executive orders and the Blueprint for AI, emphasizing the cultivation of a fair and trustworthy AI landscape, with a particular emphasis on safeguarding the well-being of students and educators (Cardona et al., 2023). Noteworthy among the American initiatives is **AI4K12**, a domestic project with the objective of integrating practical AI learning into the U.S. curriculum. The initiative is underpinned by three core principles: (1) discerning the essential aspects of AI that students should comprehend, (2) delineating the requisite skills for acquisition, and (3) instructing students on the daily application of their AI knowledge. These principles underscore the importance of aligning AI education with age-appropriate content. AI4K12 employs five overarching concepts—perception, representation and reasoning, learning, natural interaction, and societal impact—to enhance the depth of AI lessons. The overarching goal is to integrate these concepts into instructional modules, transcending the scope of mere machine learning. In doing so, students not only acquire technical knowledge about AI but also engage in contemplation regarding the integration of AI into their daily lives.

BEYOND EDUCATION: INFUSING AI INTO EVERYDAY LIVES



Beijing's innovative perspective, as evidenced by the **Consensus on AI and Education** advocating a human-centered approach (UNESCO, 2019), aligns with a broader international commitment to leverage AI technologies for collaborative enhancement in life, learning, and work. Similarly, Australia's distinct focus on generative AI technology as a national education priority, coupled with a robust framework prioritizing ethical considerations (Australia's Department of Industry, Science and Resources, 2022), contributes to the global collaborative commitment. Together with various nations, these examples underscore the shared dedication to ensuring that AI's technological advancements in education are inclusive and ethically grounded, establishing a promising foundation for globally responsible AI use in education.

Activating Global Initiatives for AI Integration in Schools

On a global scale, schools are actively fostering an environment that encourages critical thinking, personalization, and readiness for the challenges and opportunities of the 21st century. Two standout examples of this forward-thinking approach come from **Inspired Education Group** and **Nord Anglia Education.**

EDUCATION PIONEERS NURTURE CRITICAL THINKING IN THE AI ERA

Inspired Education Group, a globally recognized network of premium schools, has introduced an innovative AI platform that tailors learning experiences for students. Used in schools like **Fulham School** in London and **King's College Soto in Madrid**, the platform integrates classwork and homework, offering real-time insights and personalized exercises in subjects such as English, Maths, and Science. The pilot showed impressive improvements in students' performance (Inspired Schools, 2023).

85%

OF TEACHERS AGREE: AI PLATFORM DRIVES STUDENTS' PROGRESS *

Similarly, **Nord Anglia Education**, a leading British provider of international schools, takes a thoughtful approach to prepare students for an AI-driven future. These exist in different shapes and forms depending on the school. For example, in **Eton School in Mexico**, students interview historical figures, with the aim of critically evaluating AI-generated responses and apply the necessary changes. Additionally, **International Baccalaureate (IB)** students at the **British International School Chicago South Loop** explore language acquisition capabilities and question its potential to replace a foreign language speaker (Nord Anglia Education, 2023).

FINALLY BOOKING INTERVIEWS WITH HISTORICAL FIGURES

* (Inspired Schools, 2023)

These examples highlight a broader trend where schools are shaping policies and strategies to align AI with their educational objectives. Beyond technology, they are creating environments that stimulate critical thinking, enable personalization, and instill readiness for the dynamic challenges and opportunities of the 21st-century educational landscape. This shift towards a more integrated educational model demonstrates a commitment to fostering not only academic proficiency but also digital fluency among students. By incorporating AI into the curriculum, educators are equipping students with the skills to navigate an increasingly complex digital world, while also ensuring that learning remains relevant, engaging, and tailored to individual needs. Furthermore, these initiatives are paving the way for a future where education is not just about imparting knowledge, but about nurturing adaptable, lifelong learners who can contribute meaningfully to the ever-evolving global society.

Activating Global Initiatives for AI Integration in Universities

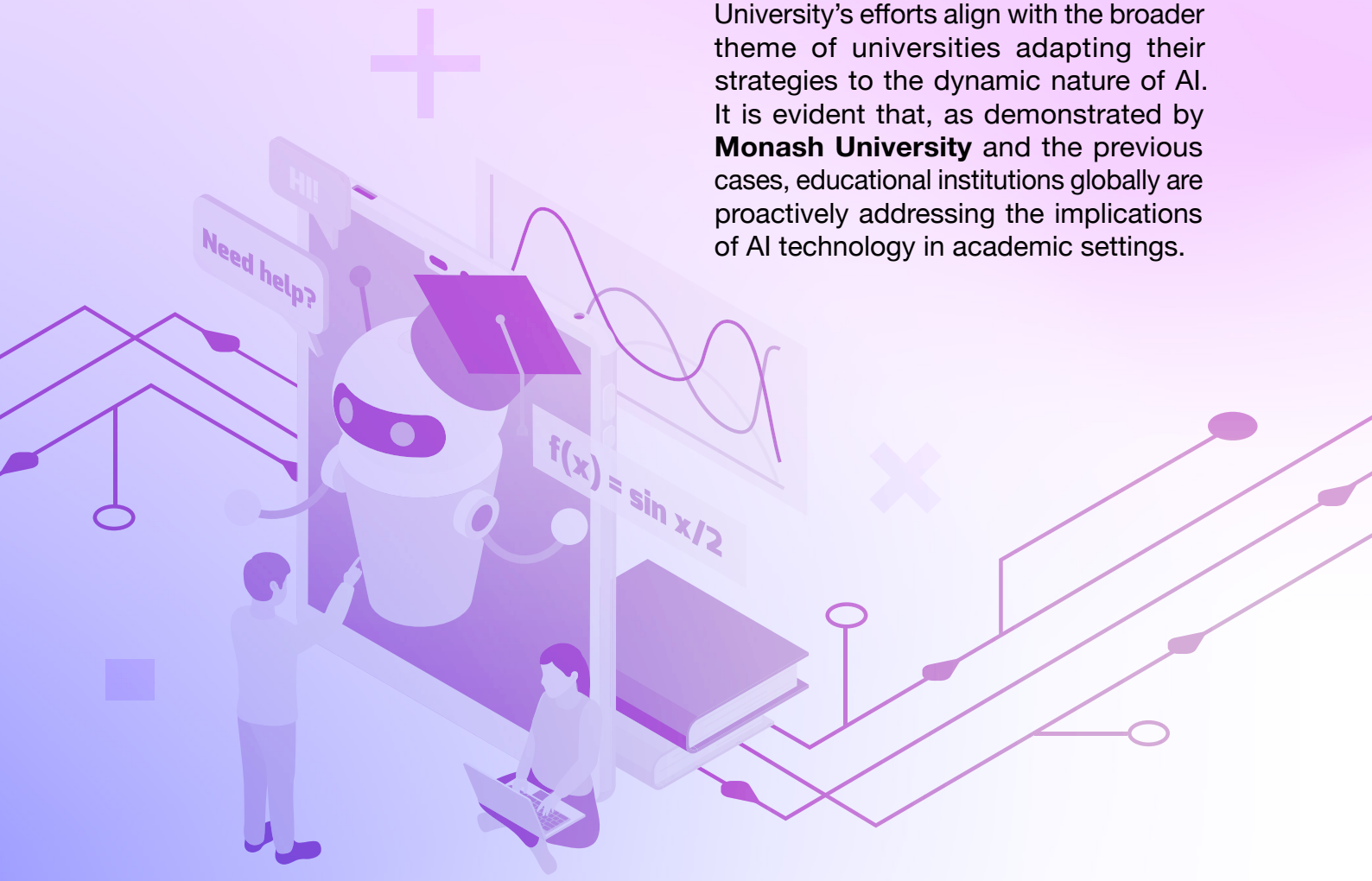
In navigating the incorporation of AI into academic settings, universities are adopting a nuanced approach characterized by a thoughtful and sophisticated strategy. This approach acknowledges the dynamic and far-reaching implications of AI on education. Within this nuanced framework, diverse strategies emerge, even within a single institution. The commitment to upholding academic integrity is exemplified by institutions like the **University of Waikato in New Zealand** and **Duke University in USA**. The former has implemented explicit guidelines to restrict the use of AI tools, ensuring fairness in academic processes (The University of Waikato, NZ). Meanwhile, Duke University has proactively updated its plagiarism policies to address the challenges posed by generative AI text, categorizing unauthorized use as a form of cheating and demonstrating a tailored response to the evolving landscape of AI in education (Duke University Learning Innovation, 2023). This nuanced approach reflects a thorough consideration of the intricacies involved in integrating AI while preserving the integrity of academic practices.

GLOBAL UNIVERSITIES ARE PROACTIVE IN FORMULATING AI PRINCIPLES AND POLICIES IN EDUCATION

A spectrum of approaches, ranging from prohibition to unrestricted permission at the **University of Delaware**, showcases a structured flexibility that accommodates varying preferences and demonstrates an openness to adapt policies in response to the dynamic nature of AI (Duke University Learning Innovation, 2023). Salem State University adopts a traditional approach, implementing a zero-tolerance policy for generative AI in a writing course to foster student skill development (Duke University Learning Innovation, 2023). In contrast, the **University of Texas** encourages thoughtful AI integration throughout various content creation phases, recognizing the evolving role of AI in technical communication (Duke University Learning Innovation, 2023).

The **University of Oxford** and the **University of Cambridge** have each formulated guiding principles intended to govern the utilization of artificial intelligence (AI) in educational settings. These principles encompass providing assistance to students and faculty to enhance AI literacy, as well as adapting teaching and assessment methodologies to integrate the ethical application of generative AI and ensure equitable access.

In conjunction with the diverse approaches discussed earlier, Monash University contributes to AI in education by formulating citation practices tailored to generative AI. This initiative, reflecting the relatively emerging stage of AI in the education sector, seeks to establish standardized and transparent practices for sourcing AI-generated content. Monash University's efforts align with the broader theme of universities adapting their strategies to the dynamic nature of AI. It is evident that, as demonstrated by **Monash University** and the previous cases, educational institutions globally are proactively addressing the implications of AI technology in academic settings.

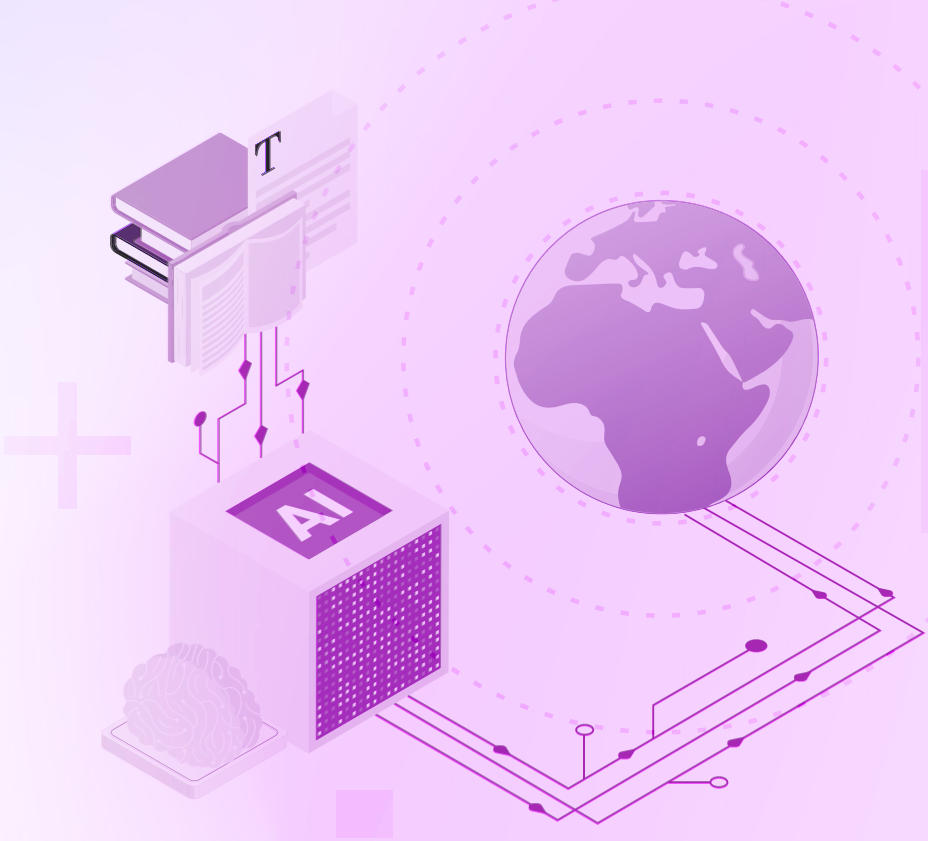


MENA Initiatives In AI In Education

The MENA region has taken noteworthy strides in the implementation of AI-centric educational systems. Specifically, the **governments of Egypt and the United Arab Emirates** (UAE) are employing AI to create intelligent tutoring systems (ITS), delivering personalized instruction to students (MICT, 2020). Among the notable achievements are the **UAE's Smart Learning Initiative** and **Egypt's Plan for Digital Egypt**, both emphasizing technology accessibility and digital literacy.

Aligned with the Saudi initiatives, universities in the MENA region are actively embracing AI in education. **The United Arab Emirates University (UAEU)** has taken a proactive stance by establishing ethical standards to govern the use of AI in educational practices, addressing key facets such as data protection, transparency, and accountability (UAEU, 2022). In Egypt, **Cairo University (CU)** has similarly prioritized ethical considerations, formulating principles specifically tailored for the use of AI in research. These principles encompass vital aspects like data protection, openness, and accountability, underlining CU's commitment to responsible AI application in academic endeavors (Cairo University, 2021).

Expanding on this regional trend, **The American University in Cairo (AUC)** has developed a comprehensive strategy for the integration of AI in education. This strategy not only reflects a commitment to ethical standards but also outlines specific principles and protocols governing the use of AI in teaching and learning (The American University in Cairo, 2023). Through these initiatives, universities across the MENA region are strategically shaping their approach to AI, emphasizing ethical considerations and establishing guidelines to harness the potential of AI for educational advancement.



UNIVERSITIES IN MENA ARE COMMITTED TO ETHICAL AI APPLICATION

KSA Initiatives in AI in Education

Saudi Arabia is spearheading AI integration in education, transforming learning and teaching with innovative, personalized programs. A prominent initiative is the "Artificial Intelligence Hour," reaching approximately 1,300 public and private schools to raise awareness and cultivate interest in AI technology, laying the groundwork for future talent and skill development (Arab News, 2023).

Crucially, universities play a central role in advancing AI research in education, with institutions like King Abdullah University of Science and Technology (KAUST) and King Saud University (KSU) actively contributing through initiatives such as the 'AI Initiative' and 'AI Center for Advanced Studies.' These efforts prioritize responsible AI application and align with the development of standardized regulations and protocols, addressing ethical concerns and enhancing data privacy in AI systems.

In Saudi Arabia, ongoing initiatives underscore the nation's commitment to developing integrated education systems in Data and AI, aligning with national strategies. This dedication reflects the country's efforts to establish a more inclusive education system with a robust emphasis on AI, in accordance with the Vision 2030 plan to diversify the economy.

The Saudi Data and Artificial Intelligence Authority (SDAIA) plays a pivotal role in the Kingdom's AI landscape, actively leveraging AI for economic development, innovation, and public service enhancement. SDAIA focuses on diverse sectors, including healthcare, education, smart cities and government services, showcasing the versatile applications of AI technologies.

Significant to the integration of AI in education is the implementation of a regulatory DATA AI (Data, Accountability, Transparency, and Accountability in Artificial Intelligence) framework, enacted as the Data Management and Personal Data Protection Standards, along with subsequent policies. This framework functions as a structured and ethical guideline, guaranteeing the responsible and secure implementation of AI in educational settings.

AI TAKES STEPS TOWARDS SHAPING FUTURE EDUCATION IN SAUDI CLASSROOMS

The regulatory DATA AI framework is pivotal for AI integration in education, ensuring responsible implementation. It encompasses key aspects, including data protection for privacy and compliance, accountability standards, transparency in AI algorithms, ethical application guidelines, legal compliance, and standards for assessing AI effectiveness. This comprehensive framework fosters continuous improvement and innovation in education.

4. CRACKING THE CODE: DYNAMIC ANALYSIS OF AI IN EDUCATION SURVEYS

Research Methodology and Design

We conducted comprehensive research utilizing a multi-faceted methodology designed to collect and analyze data, aiming to understand the diverse ways in which AI can be effectively integrated into education.

The Research Framework themes were developed to view AI integration in education comprehensively. The evaluation themes guided both the data collection and analysis. Each theme included multiple key areas to capture all the perspectives. Refer to Figure [1].

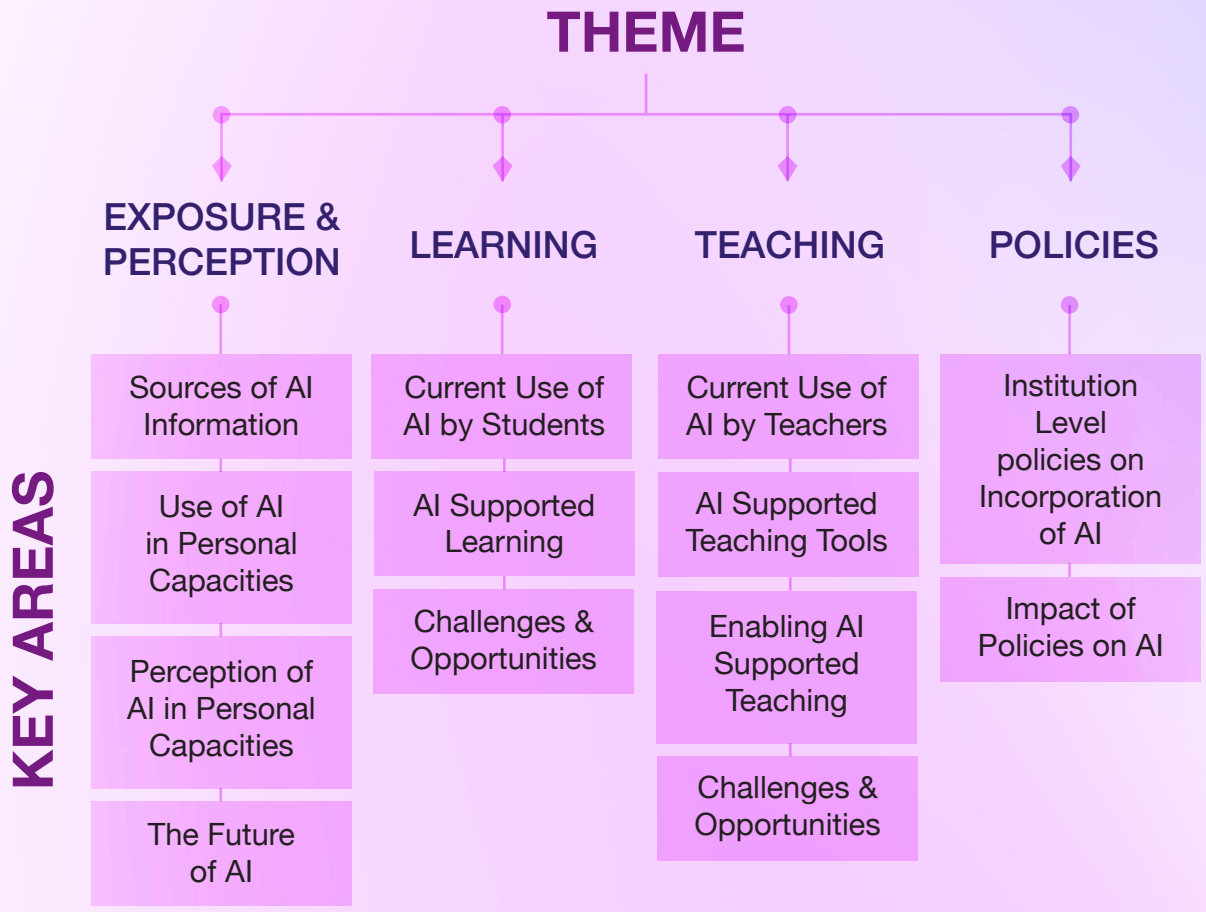


Figure 1 Data Collection and Analysis Framework

Data Collection Tools

The used mixed-methodology approach combined quantitative and qualitative methods including surveys, literature reviews, and other document analysis. Following the analysis, findings were compiled based on the contextualized framework developed.

Quantitative Data: Surveys

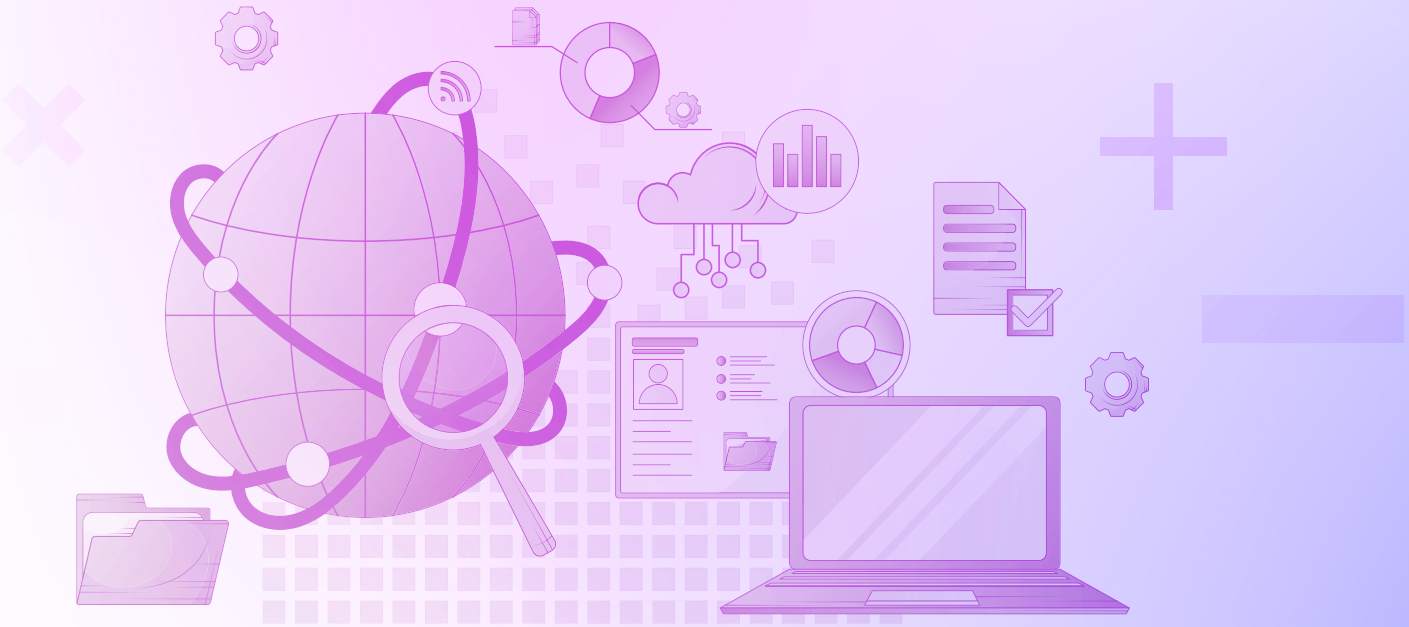
A targeted study in KSA involved the development of four surveys to comprehend the present status and perceptions of AI in education. These surveys were customized to ensure relevance and applicability to each stakeholder group. Subsequently, they were distributed through communication channels, reaching approximately 100 stakeholders in total.

By embracing this approach, a broad spectrum of perspectives, including input from academic leaders, educators, high school students, and higher education students in Saudi Arabia, was incorporated. The focus on Saudi stakeholders was intentional, given their practical involvement in the development and progress of education within the country. Notably, a significant portion of the responses came from high school students and school leaders. Despite the notable age gap, this emphasizes the active engagement of both generations in advancing and integrating AI.

Considering the study's focused nature, a suggested course of action for the future is to conduct a nationwide study on how AI is perceived and integrated into education in KSA.

Qualitative Data: Literature Review

A systematic approach was developed to review international studies and scholarly works on the evolution of technology and AI in the educational fields. This helped identify trends, gaps, and opportunities. The collected literature was then analyzed in the light of the framework and combined with data collected to generate relevant insights and recommendations.



AI in Education Survey Findings

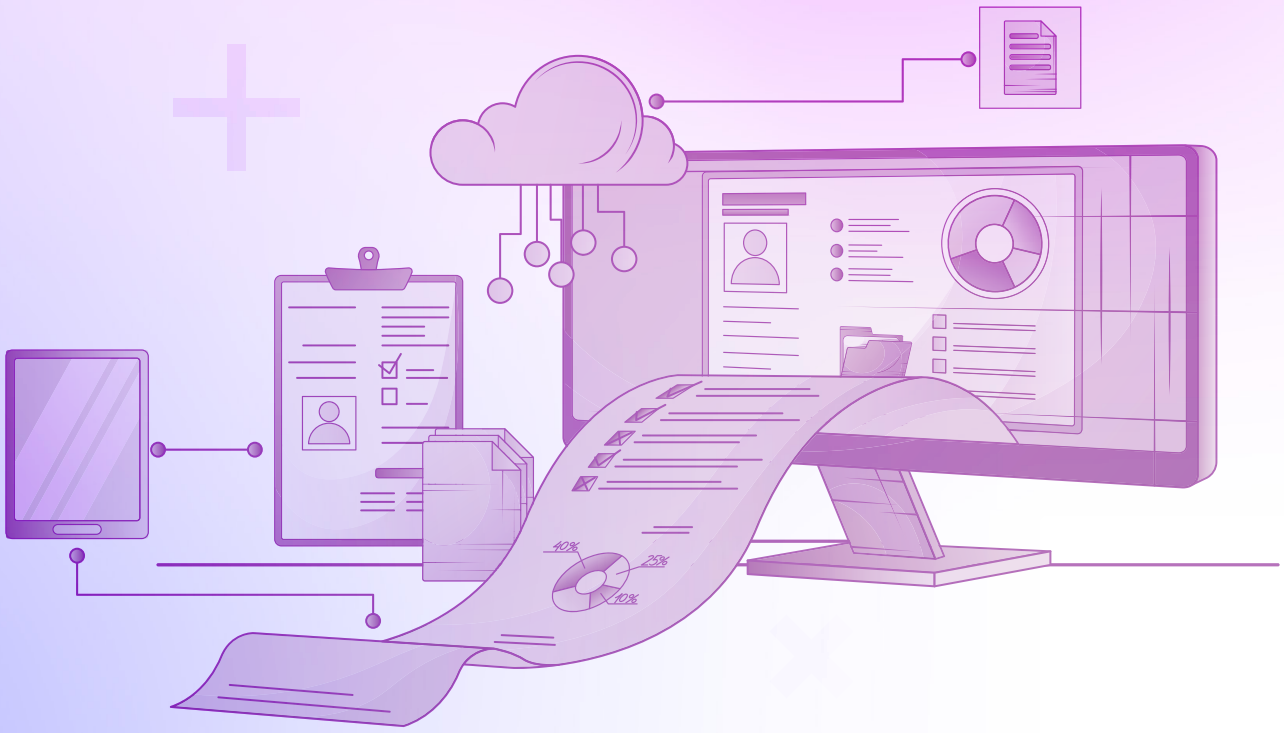
Policies

The surveys aimed to uncover stakeholder perspectives on AI policies in education, revealing a landscape of curiosity and exploration among high school students, teachers, and school leaders.

Students commonly exhibited a limited awareness of policies concerning artificial intelligence in the realm of education. While a small percentage of students' report being aware of AI-related school policies, the majority remain unaware, impacting their perception of school support for AI and hesitation in how to legitimately use the tools. This trend aligns with global initiatives, such as those in the USA, Australia, and Europe, emphasizing transparent guidelines for AI integration in education.

Concurrently, educators and school administrators encountered the common issue of insufficient policies within their educational institutions. Almost half of the participating teachers are committed to establishing these policies, aiming to enhance their roles as educators and streamline the introduction of this new and innovative educational approach for students. Likewise, the urgency conveyed by more than half of the school leaders for policy implementation aligns with international norms, underscoring the significance of a comprehensive policy framework (UNESCO, 2019).

IT'S TIME TO INTRODUCE AI POLICIES AND RAISE AWARENESS



Teaching and Learning

Student Insights on Teaching and Learning

Students identify various opportunities for AI integration in education, such as adaptive learning, efficient time management, and real-world applications. However, they also acknowledge potential challenges, including inadequate policies, excessive reliance on technology, concerns about plagiarism, privacy, data security, and technology access disparities. Regarding the use of AI tools, some students disclose reliance on applications like **ChatGPT** and **Grammarly** due to pressure for perfection, time constraints, and insufficient skills for specific tasks. Benefits include clear and direct answers, meticulous work reproduction.

School Leader Insights on Teaching and Learning

Derived from the furnished responses, educators exhibit diverse viewpoints concerning the role of AI in education. Feedback from educators shows varied opinions about AI in education, suggesting it has the capacity to augment teaching methodologies and enhance learning outcomes. Recognizing its potential to enhance teaching and learning, educators advocate for the integration of AI as an educational tool, particularly in domains such as personalized instruction, content generation, and research facilitation. Nevertheless, educators conscientiously acknowledge the attendant challenges accompanying the ascendancy of AI, including issues of policy regulation, the peril of excessive dependence on technology, and apprehensions regarding privacy.

In light of the presented context, it is discernible that school leaders generally adopt a positive stance regarding the utilization of AI language models such as **ChatGPT** and **Bard**. They perceive these models as valuable tools with multifaceted applications, including resource creation, refinement of teaching methodologies, support for lesson planning, and facilitation of protracted and intricate tasks. Concurrently, school leaders exhibit cognizance of the paramount importance of well-defined policy frameworks, considerations for privacy and data security, and the imperative of continuous teacher professional development in the integration of AI within educational contexts. Nevertheless, leaders express reservations pertaining to the potential pitfalls of excessive reliance on technology, instances of plagiarism, and the prospect of undue performance pressures in the absence of supplementary support afforded by AI tools.

STUDENTS RIDE THE AI WAVE, EDUCATORS EMBRACE THE CHALLENGES AHEAD

5. LESSONS LEARNED AND RECOMMENDATIONS FOR AI INCORPORATED EDUCATION IN KSA

In charting the course toward a future where Artificial Intelligence (AI) reshapes the landscape of education, the integration of this transformative technology carries the promise of enhancing K-12 education. Navigating this educational frontier demands a careful balance, as challenges, ethical considerations, and the imperative of equitable access come to the fore, particularly in the distinctive context of the Kingdom of Saudi Arabia (KSA). Drawing on insights from a diverse range of sources, this conclusion offers recommendations and lessons learned to guide the successful integration of AI in the Saudi educational landscape.

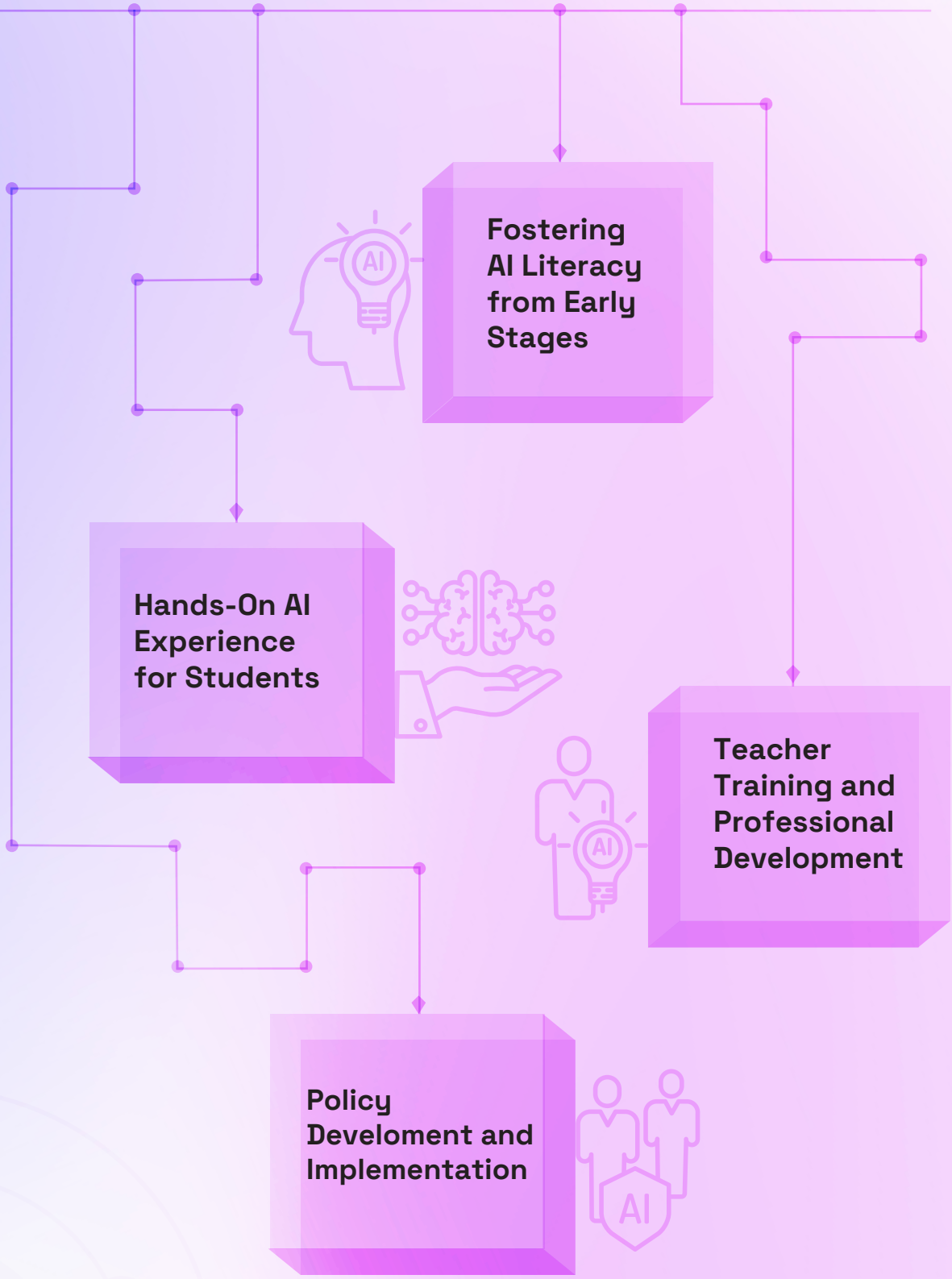
Lessons Learned

Examining global trends in AI education reveals valuable insights for successful integration, with examples from the USA, China, and Australia highlighting initiatives that prioritize

- **ETHICAL AI USE**
- **AGE-APPROPRIATE CONTENT**
- **COLLABORATION**

KSA can draw inspiration from these international models to shape its own AI in education policies. Globally, schools like **Inspired Education Group** and Nord Anglia Education showcase diverse strategies aligning AI with educational objectives, while universities such as the **University of Waikato**, **Duke University**, and **Monash University** exhibit varying approaches, from prohibition to thoughtful integration. Learning from this diversity can inform KSA's approach to AI implementation in both school and university settings. Additionally, recognizing neighboring countries like Egypt and the UAE for their efforts in implementing AI-centric educational systems is crucial. KSA can leverage insights from these MENA region initiatives, fostering collaboration and knowledge-sharing to collectively propel the advancement of AI-driven education in the region.

Recommendations



Fostering AI Literacy from Early Stages

Educators and policymakers in KSA should prioritize integrating AI literacy into the curriculum from an early stage. Learning about AI should involve helping students understand and manage AI, encouraging a shift in perspective regarding AI's role in their lives. The 'glass box learning' approach, where the inner workings of AI systems are revealed, can play a crucial role in dispelling misconceptions and fostering informed decision-making.

Hands-On AI Experience for Students

Implementing hands-on experiences with AI tools and platforms is essential. This approach bridges the gap between theoretical knowledge and practical application, allowing students to develop essential skills such as programming, data analysis, problem-solving, and critical thinking. Customizing lessons based on individual student needs and embracing adaptive learning methodologies aligns with the preferences of learners in KSA, ensuring that AI lessons are not only available but also tailored to each student's learning stage.

Teacher Training and Professional Development

Addressing the perceived complexity of AI among teachers is crucial. Professional development programs should focus on imparting basic concepts essential for understanding AI's future implications, emphasizing practical aspects such as AI-integrated learning and critical information analysis. Teachers should view AI as a facilitator rather than a standalone entity, alleviating fears and encouraging active participation in the integration of AI into the educational process.

Policy Development and Implementation

Survey respondents universally express the necessity for formulating a distinct and comprehensive AI policy. Both students and educators in KSA emphasize the requirement for explicit guidelines and policies concerning AI in education. Despite the SDAIA having already implemented pertinent regulatory frameworks and policies in KSA, there is a recognized need for heightened awareness and information dissemination regarding these policies and their specific impact on AI-integrated education.

In conclusion, as KSA embarks on its AI-driven educational journey, a proactive and collaborative approach is essential. Embracing AI literacy, hands-on experiences, teacher training, robust policies, and drawing inspiration from global and regional initiatives will contribute to a transformative and inclusive AI integration in the Saudi educational landscape.

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