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Lebanon's National AI Education Framework:

A Guide to Policy, and Competencies for Teachers and Students

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Letter from the President

Dear Educators, Policymakers, and Stakeholders,

The rapid development of Artificial Intelligence (AI) is transforming education systems worldwide. At the Center for Educational Research and Development (CRDP), we believe that preparing students and teachers to engage with AI meaningfully and ethically is essential to building an inclusive and future-ready education system in Lebanon.

This publication presents Lebanon's AI Competency Framework for students and teachers, developed to guide the integration of AI in education at multiple levels. It reflects a national vision rooted in CRDP's ongoing reform of the Lebanese National Curriculum, which is built on a competency-based approach. Among the nine transversal competencies of this renewed curriculum, Digital Literacy is recognized as a core pillar across disciplines.

One of the innovative features of the new curriculum is the creation of a dedicated learning domain entitled "Technology and Professions", which spans all educational cycles from kindergarten to grade 12. This domain comprises two interrelated fields: "Digital Technology" and "Careers and Technology", the latter explicitly aligned with the STEAM approach. The AI Competency Framework complements this vision by establishing foundational and advanced AI literacy goals aligned with local needs and global standards.

This work is grounded in key international references, including UNESCO's 2024 AI Competency Framework and the 2021 UNESCO Recommendation on the Ethics of AI. We thank the many experts and contributors who helped develop this framework, and we invite all stakeholders—educators, institutions, and partners—to engage with it and help turn its principles into actionable strategies in classrooms across Lebanon.

Professor Hiam Ishak
President, Center for Educational Research and Development (CRDP)

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List of Acronyms

AI: Artificial Intelligence

CRDP: Center for Educational Research and Development

SAC: Student AI Competency

TAI CF: Teacher - AI Competency Framework

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Executive Summary

This document presents a unified approach to integrating Artificial Intelligence into the Lebanese educational system. It comprises three interrelated components:

1. AI Policy for Lebanese Schools – A strategic guideline for AI adoption in education, ensuring ethical, safe, and effective AI use.
2. AI Competency Framework for Students – A structured framework defining essential AI literacy skills students must acquire at different educational levels.
3. AI Competency Framework for Teachers – A guide for educators to develop AI-related competencies, enabling them to integrate AI into teaching effectively.

These frameworks provide a roadmap for integrating AI into curricula while fostering critical thinking, ethical AI use, and innovation in education. The document also emphasizes the importance of capacity-building initiatives and ongoing professional development to ensure successful implementation.

General Introduction

Artificial Intelligence (AI) is transforming education worldwide, influencing how students learn and how teachers instruct. Recognizing this shift, CRDP has developed a comprehensive AI education framework that aligns with international standards while addressing Lebanon's unique educational needs.

This document serves as a guide for integrating AI into the Lebanese education system, covering policy development, competency frameworks for students and teachers, and strategies for efficient AI implementation. The goal is to equip students with essential AI literacy and ensure teachers are prepared to facilitate AI-driven learning experiences effectively.

By establishing clear guidelines and competencies, CRDP aims to promote a balanced approach that leverages AI's potential while addressing ethical and pedagogical challenges. This document lays the groundwork for AI integration in education and provides a foundation for further curriculum enhancements.

Part 1:
AI Policy for Lebanese Schools: Ethical Integration and Responsible Use

This section outlines the strategic direction for AI adoption in Lebanese schools, ensuring that AI is integrated ethically and effectively. The policy sets guidelines for AI use in classrooms, data privacy, ethical considerations, and digital literacy development.

1. Introduction

This policy sets out a clear and thorough framework for integrating Artificial Intelligence (AI) into Lebanese schools in a way that is ethical, responsible, and secure. It has been developed to align with CRDP's Educational Framework, which focuses on building core competencies and promoting student-centered learning. Additionally, the policy draws on UNESCO's recommendations for AI in education and the Lebanese University's "Guidelines on Governance and Ethics of AI in Lebanon." This policy ensures that AI technologies are used to enhance teaching and learning experiences while protecting human autonomy, safeguarding data privacy, and respecting cultural values.

2. Guiding Principles

The integration of AI in education must be guided by a set of foundational principles to ensure its ethical, responsible, and effective use. These principles prioritize the role of educators, safeguard student rights, and align with national educational objectives. By adhering to these guidelines, AI can enhance learning experiences while upholding ethical standards, inclusivity, and sustainability. The following principles reflect CRDP's vision for responsible AI adoption in Lebanese education.

2.1 Human-centered Approach

- AI should support, not replace, educators. Teachers remain responsible for pedagogical decisions.
- AI must complement human-led teaching, preserving the teacher-student relationship.
- This aligns with CRDP's principle of the "teacher as a facilitator."

2.2 Ethical and Responsible Use

- CRDP will oversee AI adoption and ensure alignment with ethical AI policies.
- AI tools must enforce non-discrimination, fairness, and transparency in AI-powered learning tools.

- Educators and students should be aware of potential AI biases, privacy concerns, and the risks of over-reliance on AI.
- This supports CRDP's emphasis on ethical citizenship and digital responsibility.

2.3 Data Privacy and Security

- AI tools must comply with Lebanese data protection laws (Law No. 81/2018).
- Personal data must be collected with consent, securely stored, and used solely for educational purposes.
- This reinforces CRDP's commitment to creating safe digital environments.

2.4 Inclusivity and Accessibility

- AI-powered assistive tools should be accessible to all students, including those with disabilities.
- Schools must prevent bias assessments or discrimination based on gender, ethnicity, or socioeconomic status.
- AI-driven language applications to support Lebanon's trilingual education system (Arabic, French and English). This implements CRDP's mandates for inclusivity and educational equity.

2.5 Continuous Professional Development

- Teachers require mandatory AI certification and ongoing training in AI ethics, tool selection, and pedagogical integration before classroom AI deployment.
- Schools should provide workshops and resources to support this training.
- Integration of AI pedagogy into teacher training programs at Lebanese universities is essential.
- This reflects CRDP's target to to enhance teacher's professional development and lifelong learning.

2.6 National AI Sovereignty

- AI adoption should align with Lebanon's digital strategy.
- Preference should be given to locally developed AI solutions or those that can be culturally adapted.
- This supports CRDP's vision for locally relevant educational technology.

2.7 Sustainability and Responsible AI Use

- AI tools must consider their environmental impact[1] .
- Schools should promote awareness of AI's environmental footprint.
- AI-powered environmental education programs should be promoted to enhance sustainability awareness.
- This aligns with CRDP's sustainability educational objectives.

3. Practical Guidelines for the Use of AI in Schools

To ensure AI is effectively and ethically integrated into education, clear guidelines must be established for its use by educators and students. These guidelines help maintain pedagogical integrity, uphold teacher accountability, and promote responsible student engagement with AI. By following these recommendations, schools can take advantage of AI's potential while preserving the core values of critical thinking, fairness, and transparency in learning.

3.1 AI in Teaching and Learning

- AI should enhance, not replace, teaching.
- Educators should encourage critical thinking by analyzing AI-generated content.
- Subject-specific use of AI should align with CRDP's pedagogical guidelines.
- Final assessments must involve teacher judgment.
- Educators should understand the decision-making processes of AI tools.

3.2 AI and Teacher Accountability

- Teachers remain responsible for AI-assisted learning decisions.
- AI should not determine grades, behavior, or academic performance.
- Schools should maintain documentation on AI tool usage.

3.3 AI and Student Use

- Schools must educate students on the risks and responsible use of AI.
- AI-generated work should not replace independent assignments.
- AI literacy should be integrated into school curricula.

1. MIT News. (2025)

4. Data Protection and Privacy

As AI becomes more integrated into education, safeguarding student and teacher data is essential. Schools must prioritize strong data protection measures, ensuring compliance with legal frameworks and ethical standards. Transparent policies, secure data storage, and informed consent are fundamental to maintaining trust and security in AI-driven education.

4.1 Protecting Personal Information

- Schools must comply with Lebanese data protection laws and GDPR principles.
- AI tools should minimize data collection and ensure secure storage.
- Personal or confidential data should not be entered into AI systems.
- Preference should be given to AI solutions with local or trusted data storage.

4.2 Consent and Transparency

- Parents and students must be informed when AI is used in the classroom.
- Opt-out options should be available for data collection.
- Privacy policies must be accessible in both Arabic and English.

5. Ethical and Fair Use of AI

The responsible use of AI in education requires a commitment to fairness, transparency, and ethical practices. Schools must ensure AI tools are utilised in way that promote equity, respect cultural values, and do not reinforce biases. Establishing clear guidelines on AI-generated content and academic integrity will help foster responsible AI use while maintaining educational standards.

5.1 Avoiding Bias and Discrimination

- Schools must audit AI tools to ensure fairness and prevent bias.
- AI-generated content should align with Lebanese cultural values.
- Regular bias checks should be conducted.

5.2 AI Content and Plagiarism

- Students must cite AI-generated content in their research.
- AI detection tools should be used to prevent plagiarism and promote ethical research instead.
- Schools should establish clear guidelines on the use of AI-assisted work.

6. AI Training and Support for Educators

For AI to be effectively and responsibly integrated into classrooms, educators must be equipped with the necessary knowledge and skills. Comprehensive training ensures that teachers can confidently implement AI tools while maintaining pedagogical integrity. Ongoing professional development and oversight from educational institutions will help sustain ethical and effective AI use in schools.

- All teachers must complete AI training before implementing AI tools in the classroom.
- Ongoing professional development should be made available to educators.
- CRDP and the Lebanese University should oversee AI curricula and teacher training programs.
- Untrained use of AI tools should not be permitted.

7. Monitoring and Compliance

To ensure responsible AI implementation, schools must establish clear monitoring mechanisms and compliance measures. Regular evaluations, educator and student feedback, and ethical reviews will help maintain transparency and accountability in AI usage. Participation in a national AI registry can further support the vetting of tools for safe and effective educational use.

- Schools must track AI usage and gather feedback from educators and students.
- Educators and students should report any AI-related concerns.
- AI tools should undergo periodic ethical reviews.
- Participation in a national AI registry for vetted tools is recommended.

8. Innovative AI Applications in Lebanese Education

AI presents opportunities to enhance education in Lebanon by supporting multilingual learning, preserving cultural heritage, and preparing students for the digital economy. Thoughtful AI integration can also strengthen educational resilience in times of crises, ensuring continuous and inclusive learning experiences.

- Multilingual Education: AI should support Lebanon's trilingual education system.
- Cultural Heritage: AI can facilitate interactive learning experiences focused on Lebanese heritage.
- Economic Development: AI curricula should prepare students for Lebanon's digital economy.
- Crises Resilience: AI should support educational continuity during emergencies.

9. Policy Review and Updates

Given the rapid evolution of AI, this policy will be continually refined to reflect new developments and align with CRDP's educational goals. Regular reviews, transparent communication, and public consultation will ensure that AI policies remain relevant and effective in supporting Lebanon's education system.

- This policy will be reviewed annually to ensure it aligns with advancements in AI and CRDP's educational framework in collaboration with UNESCO experts.
- Updates will be communicated through CRDP's official channels.
- A public consultation process will be implemented for major revisions.

10. Conclusion

The AI policy provides a framework for responsible AI integration in education, ensuring that AI enhances learning outcomes while safeguarding students' rights and privacy. CRDP emphasizes continuous monitoring and policy refinement to adapt to emerging AI developments.

This policy is designed to ensure that artificial intelligence (AI) is integrated into Lebanese schools in a way that is ethical, responsible, and secure. It aims to support educators, empower students, and protect privacy, all while aligning with the guidelines set forth by CRDP, UNESCO, and the Lebanese University. By adhering to this framework, Lebanese schools can effectively leverage the benefits of AI while upholding cultural and educational values.

Part 2: AI Competency Framework for Students

The AI competency framework for students establishes the knowledge, skills, and attitudes necessary for AI literacy. It is aligned with educational milestones to ensure that students develop a progressive understanding of AI concepts, applications, and ethical considerations.

1. Introduction

The rapid expansion of artificial intelligence (AI) across all sectors poses challenges related to machine intelligence, data use, decision-making, and societal and environmental sustainability. The educational system in Lebanon must prepare students not only to use AI but to understand its societal and environmental impacts, fostering the values, skills, and knowledge needed for responsible AI use and co-creation.

Education should empower students to shape sustainable futures by balancing relationships with technology, society, and the environment, rather than passively adopting AI. Current AI training should not only emphasize technical skills tied to commercially-focused platforms, but also broader critical and ethical issues. Our public education system needs an integral framework for AI competencies to ensure students develop foundational knowledge and engage with AI critically and ethically.

This Student AI Competency (SAC) Framework addresses this need by defining competencies in four areas: Human-centered mindset, AI ethics, techniques and applications. These are structured across two levels: understanding and application. This ensures students can ethically and effectively engage with evolving AI technologies. This work follows the AI competency framework of UNESCO, which was released in 2024 (UNESCO, 2024).

The SAC Framework aims to guide our Lebanese public education system in developing the competencies all students and citizens need to effectively implement national AI strategies and contribute to inclusive, just, and sustainable futures in this technological era.

This framework complements the Lebanese national framework for the general education curriculum[2] at the preuniversity level, which has been proposed, approved, and is now being implemented in schools across Lebanon. It aligns with the goals and objectives outlined in the national framework, building upon the established curriculum while addressing the specific needs and competencies related to AI education. This collaboration ensures that AI education is integrated effortlessly into the broader educational goals and priorities set by the Lebanese education system, supporting the development of a well-rounded, future-ready student body.

2. https://www.crdp.org/sites/default/files/2024-04/%D8%A7%D9%84%D8%A5%D8%B7%D8%A7%D8%B1%20%D8%A7%D9%84%D9%88%D8%B7%D9%86%D9%8A%20%D8%A7%D9%84%D9%84%D8%A8%D9%86%D8%A7%D9%86%D9%8A%20%D9%84%D9%85%D9%86%D9%87%D8%A7%D8%AC%20%D8%A7%D9%84%D8%AA%D8%B9%D9%84%D9%8A%D9%85%20%D8%A7%D9%84%D8%B9%D8%A7%D9%85%20%D9%85%D8%A7%20%D9%82%D8%A8%D9%84%20%D8%A7%D9%84%D8%AC%D8%A7%D9%85%D8%B9%D9%8A.pdf

2. AI Competency Frameworks in Educational Systems Worldwide

The rapid advancement of AI has underscored the necessity of integrating AI education into K-12 and higher education systems globally. AI competency frameworks have emerged as foundational tools to guide curriculum development, teacher training, and policy-making in this domain. These frameworks aim to equip students with the skills and knowledge needed to navigate an AI-driven world responsibly and effectively. This literature review explores prominent AI competency frameworks in education across various countries, highlighting their goals, structures, and implementation strategies.

2.1 Overview of AI Competency Frameworks

AI competency frameworks are designed to articulate the skills, knowledge, and ethical considerations required for understanding and interacting with AI systems. They often encompass technical competencies, such as programming and data analysis, as well as non-technical aspects, including ethical decision-making and societal impacts. These frameworks aim to bridge the gap between students' existing knowledge and the skills needed for future careers and informed citizenship in an AI-powered world (Holmes et al., 2021).

2.2 International Case Studies

2.2.1 United States

In the United States, organizations like AI4K12 have developed frameworks tailored for K-12 education. The AI4K12 initiative outlines five core principles of AI: perception, representation and reasoning, learning, natural interaction, and societal impact. These principles are organized into progression levels suitable for different grade bands, emphasizing hands-on learning and real-world applications (Touretzky et al., 2019).

2.2.2 China

China has been a global leader in integrating AI into education. The Ministry of Education's

"Artificial Intelligence Innovation Action Plan" promotes AI literacy starting in primary schools. The framework focuses on computational thinking, data literacy, and ethical awareness, with a strong emphasis on practical applications through coding and robotics (Zhang et al., 2020). The goal is to create a workforce skilled in AI to support the country's technological ambitions.

2.2.3 European Union

The European Commission has advocated for AI education as part of its Digital Education Action Plan (2021-2027). The EU emphasizes the ethical and societal dimensions of AI, encouraging member states to include AI literacy in their national curricula. Frameworks focus on interdisciplinary approaches, integrating AI education with subjects like mathematics, computer science, and ethics (European Commission, 2021).

2.2.4 Australia

Australia's "Digital Technologies Curriculum" includes AI as a critical component, aiming to foster computational thinking and problem-solving skills. The framework emphasizes student engagement through project-based learning and real-world problem-solving scenarios. Ethical considerations, such as bias in AI systems, are also integral to the curriculum (ACARA, 2020).

2.3. Common Themes and Challenges

2.3.1 Core Competencies

Across frameworks, common competencies include:

- **Technical Skills:** Programming, data analysis, and understanding AI models
- **Ethical Understanding:** Awareness of AI's societal impacts, biases, and ethical use
- **Interdisciplinary Knowledge:** Connecting AI concepts with other domains, such as economics, environmental science, and sociology

2.3.2 Pedagogical Approaches

Frameworks advocate for active learning strategies, such as:

- **Project-Based Learning:** Student engagement in hands-on projects, building AI models or analyzing datasets
- **Unplugged Activities:** Simplified, technology-free exercises to introduce AI concepts to younger students
- **Real-World Applications:** Linking AI lessons to everyday experiences to make learning relevant

2.3.3 Challenges

Despite progress, challenges persist in implementing AI competency frameworks:

- **Teacher Training:** Many educators lack the knowledge or resources to teach AI effectively
- **Equity and Access:** Disparities in technology access can hinder equitable AI education
- **Evolving Technologies:** The rapid pace of AI innovation requires continuous updates to curricula and teaching materials

To ensure the successful integration of AI education worldwide, several steps are recommended:

- **Teacher Development:** Establishing robust training programs to equip educators with AI knowledge and skills
- **Inclusive Frameworks:** Designing frameworks that accommodate diverse students and varying levels of AI readiness
- **Continuous Evaluation:** Regularly updating frameworks to reflect technological advancements and societal needs

3. Core Principles

A. Promoting a Critical Perspective on AI

Critical thinking is essential for students to engage meaningfully with AI as students, users, and creators. They must take responsibility for determining the development and use of AI to promote inclusive, environmentally sustainable futures. The SAC Framework aims to support students in becoming active co-creators and leaders in AI, preparing them to influence its future iterations.

The framework encourages students to critically examine key questions about AI's potential benefits and risks, such as its impact on human society, climate, and social equity. It also prepares students to recognize the advantages and limitations of AI, assess its trustworthiness, and make responsible, ethical decisions regarding its use.

Students are encouraged to see AI as one tool among many solutions and to focus on applying AI to real-world challenges. They are also guided to consider its effects on human agency, social inclusion, security, diversity, and the environment. The SAC Framework promotes responsible and ethical AI use, helping students reflect on key ethical issues and become contributors to AI regulations and standards in their societies.

B. Emphasizing Human-centered Engagement with AI I

In the AI era, human-AI interaction will be essential in various areas of life, including public service, commerce, education, and daily activities. The SAC Framework prioritizes developing competencies for human-centered interaction with AI. The human-centric approach emphasizes that AI should enhance human capabilities, protect dignity, and promote justice and sustainability, guided by human rights and cultural diversity principles. AI use must ensure transparency, explainability, and human control.

As AI advances, there is a risk of undermining intellectual development. AI should support, not replace, critical thinking. The SAC Framework aims to help students understand how AI collects and uses data as well as examine its impact on privacy.

C. Promoting Environmentally Sustainable AI Practices

Students, as future leaders and co-creators of AI technology, must critically understand the environmental impact of AI design and deployment. Education systems have a responsibility to teach students about carbon emissions, climate change, and the importance of protecting the environment. While powerful AI models are often prioritized, their environmental sustainability is often overlooked, with some claims suggesting AI could solve climate change. The SAC Framework aims to raise awareness of how AI training harms the environment and encourages students to explore climate-friendly approaches to AI development through project-based learning activities focused on mitigating these impacts.

D. Fostering Inclusivity in AI Skills Development

Access to AI is a fundamental right in today's world. All students should have inclusive access to AI learning environments. They should also be taught to incorporate inclusivity into AI design, preparing them to contribute to an inclusive AI society. AI competencies should enable students to understand inclusivity throughout the AI life cycle, including data selection, algorithm choices, accessibility design, and impact assessment on social inclusion.

Students should develop skills to assess AI system needs for diverse users, including those with different abilities and backgrounds. Tools that support individuals with disabilities and promote diversity should be prioritized, and AI tools without proper validation should not be recommended at scale.

E. Developing Fundamental AI Skills for Lifelong Learning

AI education should build core competencies that enable students to adapt to new knowledge, solve problems with emerging AI technologies, and engage ethically with AI. These competencies emphasize a human-centered mindset, focusing on human rights such as non-discrimination and privacy. Students should understand AI-related ethical controversies and develop skills to address bias, ensure privacy, and promote transparency and accountability.

4. Structure of the SAC Framework

The SAC Framework defines several competency blocks structured along two dimensions: three interlinked aspects of AI competencies and two levels of mastery for iterative progression. These competencies integrate knowledge, skills, and values to encourage an ethical and human-centered approach to AI systems.

The framework outlines three key components of AI competency:

- **Human-centered Mindset:** Encouraging students to critically evaluate the benefits, risks, and proportionality of AI tools
- **Ethics of AI:** Developing social and ethical awareness to navigate and contribute to principles regulating AI throughout its lifecycle
- **AI Techniques and Applications:** Combining conceptual knowledge with practical skills through practical tasks using AI tools

These interdisciplinary competencies equip students with critical thinking, problem-solving, and ethical perspectives, enabling them to engage meaningfully with AI in various contexts while preparing for further studies or careers in the field.

The framework's second dimension defines two progression levels: **Understand** and **Apply**, which represent stages of mastery for the three outlined aspects. These levels are structured to enable a spiral learning approach, helping students to gradually develop a coherent and adaptable set of AI competencies across different grade levels.

The framework matrix aligns these progression levels with the three competency aspects (refer to Table 1). This intersection results in six interconnected competency blocks that emphasize critical thinking, ethical reflection, practical application, and collaborative AI innovation. These blocks are integrated units that collectively form the foundation of AI competency, rather than isolated topics learned independently.

This matrix serves as a foundational guide, detailing minimum learning outcomes for each competency block and supporting the development of structured, cohesive AI curricula and educational programs.

Table 1. Competency Aspects and Progression Levels

	Progression Level	
Competency Aspect	Understand	Apply
Human-centered Mindset	Human Agency	Human Accountability
Ethics of AI	Embodied Ethics	Safe and Responsible Use
AI Techniques and Applications	AI Foundations	Application Skills

4.1 Progression Levels

The two levels in the framework represent progressively higher levels of sophistication, proficiency, and ethical awareness in using and co-creating AI technology. Students are expected to move through these two levels incrementally. These levels, along with the specifications for each competency block, guide evaluations of students' AI competencies and help shape contextually relevant and flexible teaching methods.

Level 1: Understand

The first level is intended for all students, as everyone will interact with AI in their lives, noting that AI providers have been collecting and manipulating data from most internet users. At this stage, students must develop the human-centered values, knowledge, and skills required to engage with AI safely and meaningfully in various contexts.

At the "Understand" level, students are expected to grasp the basic concepts of AI, including ethical issues, processes, and technical methods. They should be able to explain these concepts using real-life examples and integrate new knowledge into their existing understanding. This foundational level prepares students for more advanced AI study.

Level 2: Apply

As AI continues to influence all sectors of life, including education and work, students need to become responsible and effective AI users, both for personal growth and for addressing broader world issues. The outcomes at this level, "Apply," are designed to be relevant for all students and can be used to guide the scope and complexity of AI curriculum modules.

At the "Apply" level, students build on their basic understanding of human-centered approaches and ethical principles, along with foundational AI knowledge and skills. They are expected to apply and adapt these learned concepts in more complex contexts, critically examining advanced technical methods behind AI tools.

4.2 Aspects

The three aspects outline the key components of AI competencies that students must develop and continually update. This will enable them to become responsible users and future leaders in shaping the next generations of AI.

Table 2. Human-centered Mindset

Competency Aspects	Progression Levels	
	Understand	Apply
Human-centered Mindset	Human Agency	Human Accountability

The "Human-centered Mindset" focuses on fostering students' values, beliefs, and critical thinking in evaluating AI's purpose, its justifications, and the responsibilities of individuals and institutions in creating safe, inclusive, and ethical AI societies. This mindset is foundational for engaging with AI in all its aspects, including human identity, social

responsibility, and personal interests in the AI era.

This competency is divided into two key areas:

- **Human agency:** Students must understand that AI is human-led, with creators' decisions influencing AI's impact on human rights, society, and personal lives. They should recognize the importance of maintaining human control in AI design and use, and the consequences of losing this control.
- **Human accountability:** Students should acknowledge that AI creators bear legal and social responsibilities. They need to understand their accountability during AI design and usage, particularly in decision-making contexts, ensuring that human choice is never fully replaced by AI in critical decisions.

Table 3. Ethics of AI

Competency Aspects	Progression Levels	
	Understand	Apply
Ethics of AI	Practical Ethics	Careful and Accountable Usage

The "Ethics of AI" aspect emphasizes the ethical considerations and social reflections required for students to navigate, understand, and contribute to the evolving principles and regulations surrounding AI throughout its life cycle. Students must grasp the governance of AI ethics, considering both global implications and local contexts. With AI's rapid development creating new challenges and regulations, students should internalize ethical principles and ensure compliance with AI regulations.

Key competency areas include:

1. **Practical ethics:** Students should develop an understanding of key ethical debates surrounding AI, including its impact on human rights, inclusion, and climate change. They should adopt ethical principles in their use of AI, such as:
   - Do no harm: Recognizing AI's potential harms, like surveillance or biased algorithms, and ensuring AI tools align with human rights and regulations
   - Proportionality: Assessing whether the use of AI is appropriate to achieve its aims and if the chosen method fits the context
   - Non-discrimination: Identifying biases in AI systems and understanding the need for inclusivity and addressing AI divides
   - Sustainability: Understanding the environmental implications of AI and striving for sustainable practices
   - Human determination in human–AI collaboration: Students should understand and explain why humans must maintain ethical and legal responsibility for AI use. They

should demonstrate how humans can stay accountable in AI-assisted decision-making processes, ensuring that decisions are not entirely left to machines.

- Transparency and explainability: Students should recognize that users have the right to request clear explanations from AI designers and providers about how AI tools function, how outputs are generated from algorithms, and whether certain AI tools are suitable for users based on age or ability.

2. **Careful and accountable usage:** Students are expected to use AI responsibly, adhering to ethical principles and relevant local regulations. They must understand the risks associated with data privacy and take proactive steps to ensure their data are collected, used, shared, stored, and deleted only with informed and voluntary consent. Additionally, students are aware of the specific risks posed by certain AI systems and are capable of safeguarding their own safety and that of others when interacting with AI.

Table 4. AI Techniques and Applications

Competency Aspects	Progression Levels	
	Understand	Apply
AI Techniques and Applications	AI Foundations	Application Skills

The **"AI Techniques and Applications"** aspect focuses on the foundational knowledge and practical skills related to AI, particularly in data and AI programming. It provides the technical basis for understanding and applying a human-centered mindset in addition to ethical principles. This aspect emphasizes the importance of interdisciplinary knowledge in AI, allowing students to deepen their understanding of data and algorithms over time. Students are expected to connect conceptual AI knowledge with real-world applications, enhancing their ability to understand AI's role in society and daily life.

This competency is divided into two key areas:

- **AI Foundations:** Students build basic knowledge of AI, especially data and algorithms, and appreciate the interdisciplinary knowledge required to deepen their understanding of AI systems.
- **Application Skills:** Students develop age-appropriate skills in data, algorithms, and programming, and are expected to critically assess and use free or open-source AI tools, libraries, and datasets.

5. Defining the AI Competencies

The specifications of the AI Competency Framework for Students detail the curricular goals, pedagogical approaches, and learning environments required to foster AI competencies, emphasizing varying levels of AI readiness. They are based on the integration of formal

AI curricula, extracurricular programs, informal learning through media, and community engagement.

Key points include:

- **Curricular Integration:** AI-related learning can be introduced as standalone sessions or integrated into disciplines like computer science or ICT, with sufficient instructional time allocated during teaching periods.
- **Inclusivity and Resources:** Recommendations emphasize inclusive learning environments.
- **Pedagogical Methods:** Suggested teaching methodologies promote context-relevant delivery of AI education, inspiring teachers and students to explore innovative approaches.

These specifications are designed to equip students with foundational AI knowledge while accommodating diverse educational settings and available resources.

5.1 Level 1: Understand

The primary goal of this level is to help students develop a foundational understanding of AI by constructing age-appropriate interpretations of its values, ethical considerations, concepts, processes, and technical methods. Students are encouraged to connect their knowledge of AI to real-life experiences and link AI concepts to other areas of learning.

Key points include:

- **Curricular Goals:** Establishing foundational values, ethical principles, and knowledge to promote responsible and effective use of AI, often referred to as "AI literacy."
- **Pedagogical Methods:** Employing age-appropriate and domain-relevant teaching strategies designed to engage students, spark interest, and build learning pathways through practical tools, personal experiences, and real-world scenarios.
- **Learning Environments:** Introduce basic settings, including unplugged and low-tech activities, to make AI concepts accessible and engaging for all students.

This level focuses on providing students with the essential understanding needed to navigate and interact with AI responsibly.

The curricular goals in Table 5 outline foundational values, ethical principles, and essential knowledge that collectively ensure students can effectively and responsibly use AI - an ability often referred to as "AI literacy." The suggested pedagogical methods are designed to promote age-appropriate and domain-specific teaching practices, fostering student engagement and supporting their learning journey through concrete tools, personal experiences, and real-world applications. Additionally, the recommendations include basic learning approaches, emphasizing hands-on practice with unplugged and low-tech activities.

Table 5. Competency Areas for Level 1: Understand

	Student Competency	Curricular Goals	Pedagogical Methods
Human-centered Mindset	**Human Agency:** Students should understand that AI operates based on human decisions, with the choices made by its creators influencing human rights, interactions, and societal outcomes. They should recognize the need to protect human autonomy in AI design, deployment, and use. Additionally, students must be aware of the importance of maintaining human control over AI and the potential risks associated with its loss.	**AI as Human-Led Systems:** Students should recognize that AI systems are shaped by human decisions. Through real-world examples, they should explore key concepts such as data ownership, privacy, human rights in data collection, AI transparency, and human oversight in deployment and decision-making. There should also be emphasis that AI is a tool, not a replacement for human intellect or critical thinking. **The Importance of Human Oversight:** Help students explore the necessity of maintaining human control over AI by analyzing real-world scenarios. Highlight risks such as weak regulations allowing harmful AI, misuse of AI in critical decisions, and a lack of human validation of AI outputs. Show how human oversight	**Concept Mapping Human Agency:** Have students create visual concept maps illustrating human agency at key stages of the AI life cycle, such as data ownership, privacy, algorithm explainability, and human-controlled evaluation. Include potential societal and individual consequences of losing human agency at each step. **AI Act Courtroom Simulation:** Organize a mock trial where students act as jurors evaluating prohibited AI systems (for example, under the EU AI Act). Through deliberation, they assess creators' motivations and understand how harmful AI systems can undermine human agency, such as impairing informed decision-making.

		at regulatory, institutional, and individual levels ensures safety, ethics, and dignity. **Balancing Human and Machine Agency:** Encourage critical thinking about the dynamic relationship between human and machine agency. Use real-world examples where AI enhances human abilities, such as diagnosing diseases, automating tasks, or translating languages. Facilitate debates to examine when machine agency might be beneficial, while reinforcing that human agency must remain central in high stakes decisions. Guide students to evaluate these relationships contextually, considering specific needs and ethical implications.	**Scenario-Based Learning:** Use real-life examples to demonstrate human-AI collaboration, showcasing AI's contributions where human capabilities may be limited. Highlight how AI can enhance human tasks while emphasizing the necessity of maintaining human oversight. **Debating Human vs. Machine Agency:** Facilitate debates on the evolving roles of humans and AI in decision-making processes, using real-world dilemmas. Encourage students to critically explore the balance between human and machine agency in different contexts and visualize these dynamics.

	Student Competency	Curricular Goals	Pedagogical Methods
Ethics of AI	**Applied Ethics:** Students will develop a foundational understanding of the ethical implications of AI, including its impact on human rights, social justice, inclusion, equity, and climate change, both locally and personally. They will learn and apply key ethical principles in their reflective practices and interactions with AI tools: **Do No Harm:** **Assess** AI for regulatory compliance and potential infringements on human rights. **Proportionality:** Weigh AI's benefits against risks and costs, ensuring its appropriateness for specific contexts. **Non-Discrimination:** Identify and address biases while promoting inclusivity and sustainability, recognizing AI's societal and environmental impacts.	**Identifying Ethical Conflicts in AI Design:** Using concrete AI examples, guide students to explore dilemmas faced by creators during AI development. Key conflicts include balancing data collection with privacy, AI profit motives with human agency, and AI safety with rapid innovation. Help students understand the reasons behind these ethical challenges and the consequences of different decisions. **Scenario-Based Exploration of Ethical Principles:** Provide opportunities for students to discuss real-world cases related to the core AI ethical principles: do no harm, proportionality, nondiscrimination, sustainability, human determination, and transparency. Encourage students to build a framework for understanding AI ethics and evaluate	**Case Studies on AI Controversies:** Present real-world or simulated scenarios involving AI controversies and guide students to identify the ethical conflicts. Discuss the underlying reasons for these conflicts and encourage students to create infographics or concept maps to visualize core AI ethical principles. **Personal Reflection on Ethical Dilemmas:** Engage students in group discussions on ethical dilemmas arising from AI in daily life, such as the use of local data for AI training, AI's environmental impact, and privacy trade-offs. Encourage students to express their opinions through essays, posters, drawings, or storyboards. **Exploring 'AI for the Public Good':** Organize individual or group research projects on AI

	Human Determination: Prioritize human agency and accountability in the use and deployment of AI. **Transparency:** Advocate for users' rights to understand how AI systems function.	AI tools used in their daily lives. **Reflection on Personal Ethical Practices:** Guide students as they reflect on the impact of AI's ethical principles on their human rights, data privacy, safety, and social justice. Encourage embodied understanding by fostering personal reflection on attitudes that can address ethical challenges, such as advocating for inclusive AI designs or reporting biases in AI systems.	tools that promote equity, inclusion, social justice, and environmental sustainability. Guide students to collect evidence and validate real-world examples where AI benefits the public good, such as supporting people with disabilities or preserving cultural diversity.

	Student Competency	Curricular Goals	Pedagogical Methods
AI Techniques And applications	**AI Basics:** Students should develop an understanding of data and algorithms, connecting this knowledge with their daily activities and societal roles. This will help them cultivate a human-centered mindset and apply ethical principles by recognizing how AI functions and interacts with humans.	**Understanding the Scope of AI:** Using examples like facial recognition, social media recommendations, medical diagnoses, and self-driving cars, help students grasp what AI can and cannot do. Guide them in identifying and explaining AI tools within major categories and explaining the techniques in an age-appropriate way. **Conceptual Knowledge of AI Training:** Teach students how machine learning models are trained using data and algorithms, focusing on supervised, unsupervised, and reinforcement learning. Help them understand how data are acquired, labeled, and used, while clarifying misconceptions about AI automating algorithm programming.	**Spiral Learning from Examples to Concepts and Techniques:** Use examples to help students understand the steps involved in training a machine learning model, such as problem definition, data collection, processing, training, evaluation, deployment, and iteration. Provide opportunities for students to develop age appropriate knowledge and basic skills in using AI techniques, including datasets, algorithms, AI architecture, computing environments, and deployment planning. **Case Analysis of Innovative AI Tools and Uses:** Guide students to research innovative AI tools and applications. Help them identify the key techniques and categories of AI involved, and encourage them to write an argumentative essay

		Fostering Open-Minded Thinking on AI: Provide students with knowledge on AI methods and concepts like artificial neural networks and the differences between strong and weak AI. Encourage interdisciplinary learning, connecting AI to STEM, languages, and social studies, and fostering an understanding of how AI impacts these subjects. **Human-centered Considerations in AI Design:** Organize activities that help students reflect on AI's impact on life, work, and society. Emphasize the roles humans play throughout the AI lifecycle, including researchers, data engineers, and ethicists. Guide students to understand the ethical implications of using data for training AI systems.	or deliver an oral defense discussing how these tools may help advance human innovation or the risks they pose to ethical principles and human agency. **Building a Multidisciplinary Foundation for AI with a Focus on Mathematics:** Teach students the importance of mathematics in modern AI systems, focusing on areas like algebra, probability, statistics, and algorithms. Encourage the development of key skills in AI-related areas such as linear regression, decision trees, and neural networks, and support them in extending their interdisciplinary knowledge in science, technology, and engineering.

These learning environments provide a variety of tools and resources to enhance students' understanding of AI and its applications.

- **Unplugged Learning Tools:** Offline resources such as paper-based articles, printed materials, and worksheets offer students an opportunity to engage with AI concepts in a more hands-on, non-digital format. These tools are valuable for encouraging reflection and deep thinking without the distraction of technology.
- **Local AI Tools:** Accessible, AI-enabled devices like mobile phones with AI applications allow students to interact with real-world AI technology. This approach makes abstract concepts more tangible by providing students with practical experiences that help solidify their understanding of AI's functions and capabilities.
- **Preloaded Resources:** Recorded videos and other preloaded materials, focused on case studies or ethical dilemmas, allow students to explore AI-related scenarios at their own pace. These resources can serve as a springboard for discussion and analysis, helping students understand the complexities and challenges involved in AI applications.
- **Online Research Tools**: Digital tools such as search engines and online video platforms provide a wealth of resources for investigating AI-related case studies and ethical issues. These tools enable students to conduct in-depth research and explore a wide range of perspectives on AI technologies, fostering critical thinking and informed discussions.

5.2 Level 2: Apply

The primary objective of the "Apply" level is to help students build a strong and transferable foundation of conceptual knowledge and relevant skills related to AI. Additionally, students will become accustomed to applying a human-centered mindset and ethical principles in the assessment, learning, and practice of AI tools. The curricular goals outlined in Table 6 aim to establish a core set of values, practical ethical guidelines, and methodological knowledge that can be used to design curriculum modules and define competencies for all students. The proposed teaching strategies are designed to encourage problem-based exploration of conceptual knowledge and task-based development of operational skills, while fostering a continuous curiosity for further learning. To support effective learning at the "Apply" level, it is essential to provide appropriate hardware, software, and applications, with an emphasis on open-source options, to facilitate AI operation and co-creation.

Table 6. Competency Areas for Level 2: Apply

	Student Competency	Curricular Goals	Pedagogical Methods
Human-centered M indset	**Human Accountability:** Students should understand that AI creators and providers have legal responsibilities and that human accountability is essential in AI design and use. They must recognize that humans bear legal and social obligations when AI assists in decision-making that affects society.	**Human Accountability in AI Decision-Making:** Students should critically evaluate AI's role in decision-making, recognizing its limitations and dispelling misconceptions about its autonomy. Through real-world examples, they will explore the ethical implications of AI in areas like student assessment and job eligibility, emphasizing the need for human oversight to safeguard rights and dignity. Encourage them to take proactive steps to prevent overreliance on AI generated predictions and outputs.	**Investigating the Impact of AI-Assisted Decisions and Redress Mechanisms:** Encourage students to examine real-world examples where AI significantly influences decisions about individuals, such as AI systems used by banks to approve loans. Guide students to analyze the roles of humans and AI in decision-making processes, ensuring that human accountability aligns with relevant regulations (e.g., the EU AI Act). **Scenario-Based Practices Using AI with Purpose:** Facilitate activities where students apply AI tools to enhance writing skills, critical thinking, and creativity. Engage students in discussions about how using AI without human accountability (e.g., submitting AI-generated essays) could hinder intellectual growth. Encourage students to develop actions to protect themselves and others from over-reliance on AI outputs.

	Student Competency	Curricular Goals	Pedagogical Methods
Ethics of AI	**Following Ethical AI Practices:** They should be aware of data privacy risks and ensure that data are handled only with informed consent. Additionally, they must recognize common AI risks, understand potential system dangers, and take steps to protect themselves and others when using AI.	**Promoting Self-awareness and Routine Adherence to Ethical AI Practices:** Use real-world AI tools and scenarios to illustrate key ethical principles and regulations. Help students create and refine a checklist for responsible AI use, ensuring compliance with legal and ethical standards. Encourage them to develop habits that protect personal data, respect copyright, disclose AI-generated content, and avoid engaging in misinformation, hate speech, or sharing sensitive personal details. **Emphasizing that Human Accountability is Essential When Using AI for Decision-making:** Guide students to critically evaluate AI tools, challenge misconceptions about AI's decision-making abilities, and consider the impact of AI-driven decisions in fields like education and employment.	**Creating an "Ethics Kit" to Promote Responsible AI Use:** Develop simulated scenarios with ethical challenges, such as data privacy, AI-generated content in assignments, or misinformation. Encourage students to practice ethical AI use independently, ensuring compliance with moral standards. **Simulating AI Incidents to Help Students Understand Potential Risks and Harm:** Teach precautionary strategies for protecting personal data and ensuring informed consent. Provide safety tips for AI use and raise awareness of regulations that safeguard privacy and well-being while mitigating negative impacts.

		Fostering a Mindset of Human Accountability in AI Use by Developing Critical Thinking Skills: Encourage students to examine how AI automation in writing, research, and art impacts intellectual growth. Lead discussions on practical ways to safeguard human creativity and learning, ensuring AI enhances rather than replaces human thought and development.	

	Student Competency	Curricular Goals	Pedagogical Methods
AI Techniques and Applications	**Technical Proficiency:** Students should develop age-appropriate knowledge of data, AI algorithms, and programming while gaining transferable skills. They should also be able to critically assess and effectively use free or open-source AI tools, programming libraries, and datasets.	**Providing Task-based Learning Opportunities to Help Students Strengthen Their Knowledge and Skills in Data Modeling, Engineering, and Analysis:** Students will use appropriate tools and programming languages to acquire, clean, and transform data for storage, processing, and analysis. **Offering Opportunities for Students to Develop Age-appropriate Technical Skills in AI Programming:** Use examples of AI systems that incorporate various AI algorithms, such as supervised learning, unsupervised learning, and reinforcement learning, to help students understand these concepts. Explain how these systems collect and process data, how they are trained, how they operate, and the specific algorithms that power each type.	**Challenging the Belief That AI Will Fully Automate Coding, Making AI Programming Unnecessary for Students:** Guide students to research the professional knowledge and skills required to develop and refine AI systems, focusing on the foundational methodologies needed to explore human-centered and innovative AI algorithms. Encourage students to consider how relying on AI to replace human programming skills could reduce the acquisition of these essential skills, widenning the gap between them with and without AI expertise.

		Encouraging Students to Develop Analytical and Synthesis Skills for Using Open-source Datasets and AI Tools: Organize problem-based learning to help students critically evaluate and apply open-source AI datasets and tools from AI libraries to real-world tasks. Guide students to apply their knowledge and skills in more complex scenarios, enhancing their ability to transfer their expertise in data and algorithms across different contexts.	

6. Applying the Framework

In alignment with the newly proposed Lebanese school educational curriculum, we also present a strategy for the development of an interdisciplinary AI curriculum. The strategy aims to expand AI learning opportunities at the school level with a strong focus on computational thinking. For younger students in the early primary grades, the approach will introduce experiential, hands-on activities designed to spark curiosity and interest in AI concepts. This early exposure could include interactive projects, games, or basic AI tools that demonstrate how AI works in simple, engaging ways, helping students become familiar with foundational ideas in a playful and accessible manner.

As students progress to the higher primary grades, the strategy shifts towards deepening their understanding and applying AI in the context of core subjects like math, science, and languages This could involve integrating AI tools into project-based learning, where students use AI to solve problems, analyze data, or even create simple algorithms. The goal is to help students see AI not just as a concept, but as a tool that can enhance learning across disciplines, encouraging them to think critically about how AI can be applied in the real world.

Teachers play a crucial role in this strategy. To equip them with the necessary skills and knowledge, AI should be integrated into their professional development programs. This potentially includes providing training during initial teacher preparation courses. This way, teachers will be prepared to incorporate AI into their teaching practices effectively, ensuring they have the expertise to guide students as they develop both technical AI skills and computational thinking. In addition, ongoing professional development should be available to keep educators updated on the latest AI tools, research, and teaching strategies, creating a sustainable model of AI education across all school levels.

It is important to note that this framework does not segment the learning progression or activities according to specific grade levels. Instead, it emphasizes the outcomes that education systems should set as an aim that all students must achieve. As a result, curriculum developers must utilize this framework and its components to design a spiral learning approach across all key aspects. This approach ensures that students engage with AI concepts in a progressive and developmentally appropriate manner, allowing them to begin their AI education at a level that aligns with both their individual abilities and the readiness of their schools. By structuring AI learning in this way, students can gradually deepen their understanding, revisiting and expanding upon key concepts as they advance through their education.

Curriculum developers will be responsible for defining the core components of AI ethics and foundational knowledge and skills. They will also determine the appropriate levels of difficulty, scope, and depth for these elements across different grade levels. This structured approach will allow the creation of progressive, spiral learning iterations, incorporating lessons and project-based activities that enable students to gradually build upon and expand their understanding through continuous practice and application.

By incorporating AI competencies into the curriculum, Lebanese students will be better equipped to navigate an AI-driven world. The framework fosters analytical thinking, problem-solving, and responsible AI usage, preparing students for future academic and professional opportunities.

Part 3: AI Competency Framework for Teachers

Teachers play a crucial role in integrating AI into education. This framework provides educators with the necessary competencies to incorporate AI into their teaching practices, ensuring that they can guide students in developing AI literacy.

1. Introduction

Artificial intelligence (AI) has profound implications for education, teaching, and learning, as well as for the roles and competencies of teachers. AI's ability to process vast amounts of information, generate new content, identify patterns in diverse data formats, and support decision-making through predictive analysis presents significant opportunities. Emerging applications of AI in education highlight its potential to transform teaching, enhance learning experiences, and streamline education management.

However, AI also poses significant risks to students, educators, education systems, and society. It has the potential to diminish human agency, impact the environment, and compromise data privacy. Integrating AI into education requires thoughtful consideration to ensure its responsible use. Teachers must adapt to shifting roles and acquire new competencies to engage with AI ethically and effectively. As the primary facilitators of AI in education, they are responsible for guiding student learning, promoting safe and ethical AI use, and fostering a culture of lifelong learning in an AI-driven world. To succeed in these roles, teachers need strong institutional support to maximize AI's benefits while addressing its challenges. It is essential to take proactive measures to redefine teachers' roles and competencies, enhance teacher training centers, and develop strong capacity-building programs for effective AI integration.

The Teacher - AI Competency Framework (TAI CF) is designed to help educators develop the skills and knowledge needed to integrate AI into their teaching safely, effectively, and ethically. Rooted in a human-centered approach, the framework emphasizes that while AI can support teaching and learning management, meaningful teacher-student interactions and human flourishing must remain at the heart of education.

Technology should enhance, not replace, the role of teachers. Protecting educators' rights and ensuring fair working conditions are essential as AI becomes more prevalent in education, the workplace, and society. The Teacher - AI Competency Framework is intended for educators integrating AI to enhance learning in core subjects, rather than those specializing in advanced AI instruction. The framework outlines three key aspects and two mastery levels to define teachers' AI competencies.

1.1 Advancements in AI and Their Impact on Teacher Competencies

A key concern with AI is its heavy reliance on data mining, which raises serious privacy and ethical issues. Unlike earlier ICT tools that required direct user input for information exchange, AI systems frequently collect and analyze personal data - often without explicit

consent. The commercialization of AI services further encourages users to trade privacy for access to AI-driven benefits. These practices amplify ethical risks and have the potential to deepen societal inequalities. Therefore, it is crucial to equip teachers with the necessary knowledge to understand AI ethics and promote the responsible and secure use of AI in education.

AI's adaptability extends across various domains, enabling the development of foundation models that can be further refined for specialized applications. Generative AI, in particular, offers tools for personalized learning experiences and domain-specific model training. As AI continues to transform business, education, and social structures, teachers must be guided in understanding AI's broader societal impact. Supporting their continuous professional learning is essential to prepare them for emerging AI-driven environments and to promote responsible digital citizenship in an AI-integrated world.

2. Core Principles

Ensuring a fair and inclusive digital future in the age of AI requires a strong human and social foundation. As the primary users of AI in education, teachers play a crucial role in reshaping the evolving relationship between humans and technology, as well as knowledge and learning. The TAI Competency Framework is designed to help educators critically engage with AI by exploring the following fundamental principles:

- **Challenging AI Myths:** AI is a human-created tool, and its design and application are shaped by those who develop it. AI systems can either enhance human potential and protect rights or, if poorly designed, introduce biases and undermine agency. Teachers must cultivate the ability to critically assess AI's benefits and risks, recognizing that ethical AI development ("ethics by design") and proper regulation are essential for fostering inclusivity, sustainability, and human empowerment.
- **Recognizing AI-Related Threats:** Current AI models pose significant risks to human rights, privacy, and cultural diversity. AI-generated content has the potential to erode indigenous knowledge, languages, and traditions. To safeguard human agency and cultural diversity, teachers need a clear understanding of how AI is designed and how its models operate.
- **Prioritizing Human and Social Values:** Teachers should highlight values like empathy, altruism, justice, and intercultural understanding to promote unity and uphold our collective humanity. AI and digital technologies should serve to strengthen, not replace, authentic human connections and the respect for diverse cultures and ways of life.
- **Guiding AI for Human Capacity Development:** If used without thoughtful pedagogy, AI in education may hinder students' intellectual growth by promoting passive consumption of information. The goal of AI in education should extend beyond simply providing access to data and automated responses. Instead, it should support inquiry-driven learning, critical thinking, and the development of students' intellectual and creative capacities.

By embracing these principles, teachers can ensure that AI is used responsibly to enhance education while safeguarding human dignity, diversity, and agency.

2.1 An Approach to AI Centered on Human Values

A human-centered approach to AI in education is essential. This approach fosters key ethical and practical principles to regulate and guide the practices of all stakeholders throughout the entire life cycle of AI systems. The TAI CF builds on the following principles with a focus on teacher mindsets and AI ethics:

- **Empowering teachers' human-accountable use of AI:** Ethical and legal responsibility for designing and using AI should lie with individuals. Teachers must be responsible for pedagogical decisions regarding AI use in teaching and guiding its use by students. For teachers to be accountable, policymakers, teacher training centers, and schools must ensure proper preparation and ongoing support for teachers in effectively using AI.
- **Promoting inclusivity:** AI design and use may embed structural exclusion and discrimination. Teachers must be aware of potential algorithmic biases and ensure AI is applied inclusively for all students, regardless of gender, ethnicity, or abilities. Teachers should also be supported in fostering social inclusion and cultural pluralism through the use of AI.
- **Recognizing the right to question the explainability of AI tools:** AI models that generate responses that seem reliable may lack explainability and could carry hidden risks. The TAI CF equips teachers with the knowledge and skills, appropriate to their pedagogical responsibilities, to understand and critically evaluate AI tools. This allows teachers to assess how AI reaches its conclusions, enabling them to intervene when necessary to ensure safety and transparency.
- **Understanding and monitoring the human-controlled impact of AI:** Teachers must recognize that AI is designed and led by humans, and the decisions behind these designs impact human rights, dignity, and social and environmental well-being. The TAI CF helps teachers become aware of the intent behind AI tool designs and enhances their ability to control AI's benefits while mitigating potential negative impacts on students' learning and well-being.

2.2 Ensuring Relevance for all Teachers and Aligning with Digital Advancements

AI competency is becoming a key requirement for the teaching profession. The TAI CF is therefore crafted to be inclusive and universally applicable to all teachers, regardless of their digital expertise or the educational context they work in. The framework adopts a progressive approach, allowing teachers – whether they have prior AI knowledge or not – to develop their understanding and skills from foundational to more advanced levels. It ensures that all teachers, regardless of their starting point, have the opportunity to enhance their understanding and application of accessible and affordable technology, ranging from basic, low-tech solutions to more AI-integrated environments.

Given the unique ethical challenges and transformative potential of AI, it's essential to equip teachers with the human-centered mindset, ethical principles, conceptual knowledge, and practical skills to control AI to improve student learning and support their own professional

growth. The framework aims to develop competencies that are transferable across various learning contexts, ensuring teachers can effectively navigate the fast-paced advancements in AI technology and its implications for education.

2.3 Lifelong Professional Learning for Teachers

Teacher development should be seen as a continuous, lifelong journey of professional growth that evolves throughout a teacher's career and life experiences. The TAI CF advocates for a holistic approach to support ongoing learning, as outlined below:

- **Facilitating Personal Progression through Transferable Competencies:** Given the rapid growth of AI technologies, their complex ethical considerations, and the challenges of incorporating AI into teaching practices, teachers need ongoing support to progressively enhance their AI competencies. The TAI CF outlines competencies at multiple levels to guide this development and recommends training methods that keep teachers up to date with emerging technologies, their ethical implications, and their broader societal impact.
- **Streamlining Training and Support Programs:** Effective lifelong professional learning requires coherent and accessible training and support. The TAI CF emphasizes the development of professional learning programs while fostering a human-centered approach to education.
- **Adapting Policies to Support Lifelong Learning:** Supportive policies and incentive structures are crucial to maintaining teachers' motivation for ongoing professional development. Teacher management policies should ensure that teachers have adequate time and resources for training and professional growth.

3. Structure of the TAI Competency Framework

3.1 Dimensions of the TAI CF

The AI competency framework for teachers is structured as a two-dimensional matrix, consisting of three competency areas that progress across two levels, forming a total of six blocks, as illustrated in Table 7.

Table 7. Competency Aspects and Progression Levels

	Progression Levels	
Competency Aspects	**Understand**	**Cultivate**
Human-centered Mindset	Human Agency	Human Accountability
Ethics of AI	Embodied Ethics	Safe and Responsible Use
AI Techniques and Applications	AI Foundations	Application Skills

The first dimension represents the three competency areas, which are listed in the leftmost column of the table. These areas encompass the essential knowledge, skills, values, and attitudes that teachers must develop to integrate AI effectively and ethically into their teaching practices, and learning facilitation. The three key areas are: a human-centered mindset, ethics of AI, and AI techniques and applications. These areas are interconnected and mutually supportive, contributing to the overall growth of AI competence.

- **The Human-centered Mindset** aspect defines the values and attitudes towards human-AI interactions that teachers must foster.
- **The Ethics of AI** aspect outlines the essential ethical principles, regulations, institutional laws, and practical ethical rules that teachers need to comprehend, apply, and help shape.
- **The AI Techniques and Applications** aspect details the conceptual knowledge and transferable skills that teachers require to understand, choose, and creatively adapt AI tools to support student-centered, AI-enhanced teaching and learning environments.

The second dimension of the TAI CF, represented across the top of Table 7, outlines the scaffolded progression of competency development. These progression levels reflect the potential growth teachers may experience over time across all three competency areas as part of their overall AI competency. The two progression levels are:

- **Understand:** Defines the essential AI competencies that all teachers need to evaluate, select, and use AI tools effectively in education
- **Cultivate:** Specifies intermediate competencies required to design meaningful pedagogical strategies incorporating AI

By intersecting these two levels with the three competency areas, the TAI CF defines six competency blocks. These blocks are designed to support all teachers, from those with no prior knowledge of AI to those with higher levels of competence and experience.

3.2 Aspects of the TAI CF

The three aspects of the TAI CF are designed to encompass key competency domains and highlight their interconnected nature. When developing training programs to guide teachers from **'Understand'** to **'Cultivate'**, all three aspects should be integrated and targeted to ensure comprehensive competency growth. The main components of these aspects are summarized as follows:

3.2.1 Aspect 1: Human-centered Mindset.

This aspect focuses on the values and critical attitudes teachers must cultivate regarding human-AI interactions, rooted in the previously mentioned principles. It emphasizes placing human rights and the well-being of individuals at the core of AI's role in education. Teachers are encouraged to develop critical methodologies for assessing the benefits and risks of AI, ensuring human agency and accountability, while understanding AI's societal impact and its implications for citizenship in the AI era.

3.2.2 Aspect 2: Ethics of AI

The Ethics of AI aspect outlines the essential ethical values, principles, regulations, laws, and practical ethical guidelines that teachers must understand and apply. These are drawn from the rapidly evolving field of AI ethics and their relevance to education. This aspect defines teachers' increasing understanding of AI ethics, equipping them with the skills to use AI responsibly and safely, and providing competencies to contribute to the adaptation of ethical rules.

3.2.3 Aspect 3: AI Techniques and Applications

The AI Techniques and Applications aspect addresses the conceptual knowledge and transferable operational skills teachers need to effectively select, apply, and creatively customize AI tools to foster student-centered, AI assisted teaching and learning environments. Teachers should acquire a solid understanding of AI's definition, how it works, and the key categories of AI technologies. They will also develop the skills to evaluate the appropriateness and limitations of AI tools based on specific needs and contexts.

3.3 Progression Levels of the TAI CF

The progression levels of the AI CFT are structured to evaluate teachers' current AI competencies and define the expected learning objectives for their professional development. At the **'Understand'** level, the focus is on teachers with little or no prior knowledge or experience in AI. All teachers should have access to this level of training or guidance, allowing them to develop the fundamental competencies outlined in the framework. Essentially, this level aims to build foundational AI literacy for teachers.

The **'Cultivate'** level targets teachers who already possess AI knowledge and have experience using AI in educational contexts. This stage seeks to help teachers deepen and apply their understanding of AI tools to enhance teaching and learning practices more effectively.

These progression levels provide clear benchmarks for where teachers start and outline the next learning objectives, allowing for the mapping of training programs' complexity and scope. When using the TAI CF as a framework for evaluating teacher competencies, it's important to remember that each progression level applies across all three competency aspects (as shown in Table 7). Progress in one aspect is expected to support growth in others, reflecting the complementary and interdependent nature of these aspects.

3.3.1 Progression Level 1: Understand

The **'Understand'** level represents the foundational stage of AI learning and its practical application in education. At this stage, teachers develop the essential competencies needed to evaluate, select, and use AI tools effectively and ethically in their teaching practice. They begin by building fundamental knowledge and skills necessary for responsible AI use, recognizing both its potential benefits and associated risks in education.

Teachers at this level gain a foundational understanding of AI, guided by principles of human rights and human-centered values. They are introduced to key ethical considerations, emphasizing AI's human-led nature and the critical role of human oversight in its development and application. Additionally, they learn to apply basic AI techniques and utilize locally accessible AI tools in ways that support their teaching.

3.3.2 Progression Level 2: Cultivate

At the **'Cultivate'** level, teachers advance their AI competencies by integrating AI into educational practices while prioritizing human accountability, safety, and responsible use. They recognize how AI design choices influence ethical use and are equipped to evaluate, select, and apply AI tools to enhance teaching and learning experiences.

Additionally, teachers at this level refine their ability to implement human-centered pedagogical strategies, employing AI to create more engaging, adaptive, and student-focused learning environments. They also utilize AI for their own professional growth, fostering collaboration and peer learning within their educational communities.

4. Defining the TAI Competencies

This section outlines the specific curricular goals and learning objectives that teacher training and support programs can establish for each of the six competency blocks.

4.1 Progression Level 1: Understand

The primary goal at the **'Understand'** level is to ensure that all teachers develop a foundational level of AI competency or literacy essential to the teaching profession across diverse educational settings. The following goals, learning objectives, and example activities clarify the expectations for each competency block.

Table 8. Competency Areas for Level 1: Understand

	Teacher Competency	Instructional Goals	Learning Objectives	Practical Engagements
Human-centered mindset	**Human Agency:** Teachers possess a critical understanding that AI is driven by human decisions, recognizing that the choices made by both corporations and individuals in AI development significantly influence human autonomy and rights. They are mindful of the importance of human agency when assessing and utilizing AI tools.	Promote critical thinking about AI by facilitating discussions where teachers explore various perspectives regarding the balance between AI's benefits and its potential risks to human autonomy and agency. Use real-world AI tools as case studies to help teachers critically analyze their advantages, limitations, and implications in local educational settings and their own professional responsibilities. Explain the key stages in the AI system life cycle, guiding teachers to understand how decisions made by corporations and individual developers influence AI's impact. Emphasize the risks of excessive dependence on AI, highlighting	Critically reflect on the benefits, limitations and risks of specific AI tools in their local educational settings and the subject matters and grade levels they teach. Demonstrate an awareness that AI is human-led and the corporate and individual decisions of AI creators affect the impacts on human rights, human agency, individual lives, and societies. Outline the role of humans in the basic steps involved in AI development, from the collection and processing of data, passing through the design of algorithms and functionalities of an AI system, to the deployment and use of AI tools. Understand the need to use basic measures to protect human agency in key steps regarding the design and use of AI systems	**Debunking AI Hype:** Critically analyze the hype surrounding specific AI tools through a basic risk-benefit evaluation, emphasizing the essential role of humans in utilizing AI effectively. **Highlighting Potential Risks:** Identify ways in which teachers' and students' autonomy might be compromised by certain AI tools, such as the use of large language models for essay writing. **Promoting Best Practices:** Provide practical tips for maintaining human agency in AI use within teaching, and encourage student autonomy in both utilizing and critically evaluating AI tools.

		how it can diminish critical thinking skills and human agency.	by ensuring respect for data ownership, collection of data with consent, and user-friendliness.	
Ethics of AI	**Ethical Principles:** Teachers possess a foundational understanding of the ethical challenges related to AI and the principles necessary for ethical human-AI interactions. This includes ensuring human agency and supporting environmental sustainability.	Explore ethical controversies by critically examining real-world examples of AI tools used in education. Facilitate an understanding of key ethical principles through case studies related to each core principle. Help teachers recognize why these principles are vital and how overlooking them can lead to harm. The principles include: "do no harm," proportionality, sustainability, human agency in human-AI interactions, and transparency and explainability. Connect ethical principles to standards by presenting examples of international AI ethics regulations. Discuss the implications for individuals and explain how core ethical principles are incorporated into regulatory frameworks.	Provide examples of key ethical controversies in the use of specific AI tools, considering aspects such as human agency, security, and privacy. Align relevant articles with ethical principles and understand their implications for the educational context.	**Ethical Perspective-taking in AI Dilemmas:** Develop an ethical viewpoint on AI use in schools by understanding the various dilemmas related to privacy, human agency, and climate change. **Knowledge Mapping of Ethical Principles:** Use basic knowledge mapping tools (e.g., paper-based worksheets) to illustrate the relationships between core ethical principles and responses to related controversies.

	Teacher Competency	Instructional Goals	Learning Objectives	Practical Engagements
AI Techniques and Applications	**Fundamental AI Concepts and Applications:** Teachers are expected to gain foundational knowledge of AI, which includes: understanding the definition of AI, the basic insights into how AI models are trained, and the ways of becoming familiar with data and algorithms; knowledge of the primary categories of AI technologies and examples of each; as well as the ability to assess the suitability of specific AI tools for educational purposes.	Adjust the density of basic AI concepts based on teachers' roles and prior knowledge of AI; demonstrate how a particular AI tool is built using data and algorithms, and clarify the basic techniques AI tools employ to process data and produce results. Facilitate the practical use of AI tools relevant to teachers' roles to provide a foundational understanding of their functionality; and guide teachers through experiences with different AI tools, helping them recognize technological advancements in AI compared to earlier ICT tools, as well as the diverse functions of various AI categories.	Demonstrate a clear understanding of how AI systems are developed using data, algorithms, and computing architecture. Acquire knowledge and skills related to data, algorithms, and programming; and illustrate the key steps involved in AI development, such as problem scoping, design, training, testing, deployment, feedback, and iteration. Clarify what AI is and what it isn't; describe the main categories of AI techniques and technologies; highlight the new capabilities AI brings compared to earlier generations of ICT tools; and explain the core functions of different AI tool categories. Identify and use AI tools relevant to their day-to-day tasks within local educational contexts.	**Conceptual Mapping of AI Functions:** Begin creating and continuously updating paper based or digital concept maps that illustrate how AI systems are developed and the decision-making workflow involved. **Enhancement of Skills:** Broaden knowledge of AI tools relevant to the teachers' responsibilities. Support the refinement of existing operational skills and encourage the development of new skills. **AI Tool Selection "Navigation Compass":** Identify which tools incorporate AI and which do not. Compare the advantages and limitations of ICT tools versus AI tools in the context of local educational needs.

4.2 Progression Level 2: Cultivate

The primary goal at the **'Cultivate'** level is to guide teachers toward full competency in utilizing AI. At this stage, teachers are expected to adopt human-centered perspectives in their analyses and decisions, exhibit ethically responsible behaviors, deepen their conceptual understanding of AI, and develop the ability to apply AI effectively to enhance pedagogical practices and professional growth. The following goals, learning objectives, and activity examples outline the key topics to be covered, how training can be structured, and the behaviors teachers should demonstrate after achieving each competency block.

Table 9. Competency Areas for Level 2: Cultivate

	Teacher Competency	Instructional Goals	Learning Objectives	Practical Engagements
Human-centered Mindset	**Human Accountability:** Teachers demonstrate a comprehensive understanding of human accountability and decision-making in the effective deployment and use of AI. They possess a critical ability to evaluate AI's role in facilitating human AI decision-making processes and assess overhyped claims regarding AI's potential to replace humans in making high-stakes educational decisions.	Deepen teachers' comprehension of the risks arising from the lack of human accountability by analyzing use cases of AI in decision-making for educational management, assessments, teaching strategies, and student interactions. Foster the recognition that human accountability is a legal responsibility by prompting teachers to debate whether accountability in AI-assisted decision loops should lie with humans or AI. Guide teachers to examine	Understand that human accountability in human–AI decision loops is a legal responsibility.	**Human Accountability in AI-assisted Decision Loops As a Legal Responsibility:** Create a concept map outlining the key duty-bearers and their roles in the design, deployment, and use of AI in education, specifying their human accountability.

		how regulatory frameworks define human accountability in AI design and AI services. Strengthen the connection between human accountability and teachers' rights by focusing on the evolving roles and responsibilities of teachers. Emphasize that AI cannot replace the central role of educators, nor can it undermine teachers' accountability and autonomy. Explore the risks associated with the absence of user accountability by encouraging teachers to investigate the limitations of specific AI tools, such as AI's inability to make value-based judgments. Discuss issues like AI's potential for generating incorrect answers, and misrepresentations.		

Ethics in AI	**Ethical and Responsible AI Use:** Teachers should internalize key ethical principles for the safe and responsible use of AI, including compliance with intellectual property rights and relevant legal frameworks. They should consistently apply these principles when evaluating and using AI tools, handling data, and integrating AI generated content in educational settings.	Enhance teachers' understanding of key AI safety risks by analyzing case studies of common AI safety threats and incidents. This analysis should consider two perspectives: institutional versus personal AI safety responsibilities. Facilitate discussions on legal responsibilities when using AI, including the consequences of violations such as unauthorized use of copyrighted content, breaches of data privacy, and dissemination of misinformation. Engage teachers in case study discussions to deepen their awareness of the social and legal implications of irresponsible AI use. Guide teachers in researching relevant international regulations, adapting them to local needs, and collaboratively	Explain key AI safety concerns at both institutional and personal levels, demonstrating a thorough understanding of factors such as data ownership and privacy. Recognize individuals' rights to refuse sharing personal data with AI service providers, and avoid disclosing sensitive personal information in AI prompts. Evaluate potential ethical risks associated with AI tools in education and propose strategies to mitigate these risks. Implement protective measures to safeguard teachers' and students' data privacy, ensuring data are collected, used, shared, stored, and deleted with informed consent. Identify and address hidden risks, especially for students with special needs.	**Personal AI Safety Tracker:** Create and regularly update a conceptual map identifying common AI safety risks, frequent incidents, and their root causes. Highlight potential threats to institutions and individuals, and outline mitigation strategies at both school and personal levels based on real-world case studies. **Continuous Refinement of AI Guidelines:** Monitor and analyze cases of high-risk or irresponsible AI use in schools. Regularly update a list of AI-related dos and don'ts for teachers and students. Educate students on relevant ethical and legal principles, emphasizing the consequences of violating local or international AI regulations.

		drafting classroom, or personal guidelines for the safe and responsible use of AI.	Apply ethical guidelines to promote responsible AI use among teachers and students. This includes respecting copyright issues, mitigating biases, identifying and countering deepfakes, and protecting users from AI-driven bullying.	
AI Techniques and Applications	**Practical AI Application Skills:** Teachers should be proficient in using AI tools implemented in educational settings. They are expected to expand their understanding of different categories of AI technologies and enhance their practical skills in working with data and algorithms relevant to their teaching responsibilities and expertise. Additionally, they should integrate ethical principles into	Enhance teachers' hands-on experience with AI tools by guiding them through their core functions and operational techniques. Support teachers in building deeper conceptual knowledge through research-based learning. Help them explore how AI systems, such as large language models, are trained and tested, including the algorithms, models, and datasets used in the process. Foster problem-based learning to develop teachers' skills in data,	Demonstrate proficiency in using commonly adopted AI tools in both everyday life and educational settings. Create visual representations to help teachers illustrate the inner workings of selected AI systems, including their training and testing processes, as well as the models, algorithms, and datasets they rely on. Apply foundational knowledge of data, algorithms, and coding to solve relevant problems within	**Visualized 'knowhow' on Typical Categories of AI Tools:** Draw a concept map or visualized workflow to explain how selected AI systems are trained and how they work. **Facilitating Students' Learning about Data, Algorithms and Coding:** Help students who are at the beginner level to acquire knowledge and skills related to data, algorithms and coding.

	their AI practices to ensure responsible and effective use.	algorithms, and coding. Design real-world scenarios aligned with their prior knowledge and teaching responsibilities to enhance their ability to apply these skills in AI development and educational contexts. Provide hands-on training in assessing AI tools for ethical considerations. Guide teachers to review and refine assessment criteria related to AI ethics, including data security, privacy, accessibility, algorithmic bias, and potential risks to vulnerable groups. Facilitate the application of these criteria to evaluate AI tools used in education.	their scope of expertise and teaching responsibilities.	

5. Applying the Framework

Implementing the TAI Competency Framework in our schools requires a structured approach that addresses teachers' readiness, available tools, competency levels, and ongoing professional development. Below is an implementation strategy to integrate AI competencies into teacher training and practice.

5.1. AI Readiness Assessment

Before implementation, it is critical to conduct a thorough assessment of AI readiness at the school level.

5.1.1 Assessing Available AI Tools and Infrastructure

- Conduct an inventory of AI-related tools and technologies available for both teachers and students (e.g., AI-Powered learning platforms, chatbots, intelligent tutoring systems, and AI-based assessment tools).
- Identify gaps in AI infrastructure, such as lack of access to reliable internet, outdated computer labs, or insufficient software tools.

5.1.2 Evaluating Teachers' AI Competency Levels

- Conduct focus group discussions with representative teachers to understand their concerns, interests, and perceived challenges in adopting AI.

5.1.3 Identifying Training Needs

- Based on the findings, categorize teachers according to their competency levels (e.g., beginner, intermediate, advanced) to tailor professional development.
- Identify key areas where teachers need support, such as AI ethics, AI-enhanced teaching strategies, or integrating AI into lesson plans.

5.2 AI Training and Professional Development for Teachers

Once readiness is assessed, structured training programs should be implemented to equip teachers with essential AI competencies.

5.2.1 Online AI Training Courses for Teachers

- Develop or adopt online courses covering:
  - o Foundations of AI (basic AI concepts, algorithms, and machine learning principles);
  - o Ethics of AI (bias in AI, data privacy, responsible AI use); and
  - o Techniques & Applications of AI in Education (how AI can be used for assessment, personalized learning, and administrative automation).

5.2.2 Hands-on AI Workshops & Practical Learning

- Organize in-person or virtual AI workshops where teachers get hands-on experience with AI tools.
- Assign teachers to real-world AI projects in education (e.g., using AI-powered grading tools, chatbots).

- Encourage teachers to explore AI coding tools like Scratch with AI, Teachable Machine, or AI for Everyone by Coursera.

5.3 Embedding AI CFT in Teacher Training centers

To ensure sustainable AI competency growth, the TAI CF should be embedded in teacher-training centers.

5.3.1 Integration into Pre-Service Teacher Training Programs

- Ensure all new teachers receive AI literacy training before they enter the classroom.
- Develop AI-focused teaching methodologies courses for pre-service educators.

5.4. Implementation of AI in Classroom Practices

Once teachers are trained, AI competencies should be applied directly in teaching and learning activities.

5.4.1 AI-Enhanced Lesson Planning & Pedagogy

- Provide teachers with lesson templates and guidelines for integrating AI into various subjects.
- Encourage the use of AI-powered tools for student engagement.

5.5 Monitoring, Evaluation & Continuous Improvement

To ensure the TAI CF implementation is effective, it must be continuously monitored. This includes collecting feedback from teachers, students, and school leaders on AI integration challenges and successes.

5.6 Industry & Tech Partnerships

- Partner with tech companies (e.g., Google, Microsoft, IBM) to access free AI training and tools for educators.
- Leverage open-source AI tools for cost-effective AI integration.

Equipping teachers with AI competencies is essential for effective AI integration in education. This framework supports teacher training programs, professional development initiatives, and ethical AI use in classrooms. Continuous upskilling will ensure that educators remain at the forefront of AI advancements.

General Conclusion

The integration of AI into Lebanon's education system requires a structured approach that balances innovation with ethical responsibility. This unified document serves as a foundational guide for AI adoption in schools, ensuring that both students and teachers are prepared for the evolving digital landscape.

CRDP is committed to working with stakeholders to implement the principales of these frameworks effectively. By fostering AI literacy and responsible AI use, Lebanon's education system can become a model of digital transformation that empowers future generations.

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