Validating the AGI²E² Framework: Expert Perspectives on Integrating Artificial General Intelligence into Engineering Education

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This study explores the initial validation of the AGI²E² Framework, a guide for integrating Artificial General Intelligence (AGI) into engineering education. The framework aims to balance technical and human-centered skills, preparing students for the demands of Industry 5.0. Expert perspectives from academia and industry were gathered to assess the framework's relevance, feasibility, and potential for real-world application. Findings emphasize the necessity of aligning technical proficiency with creativity, ethical reasoning, and adaptability, supported by institutional backing and faculty training.

Objective

To assess the content validity of the AGI²E² Framework.

RQ1: How do experts perceive the relevance, feasibility, and applicability of the AGI²E² Framework?

RQ2: What strengths, weaknesses, and recommendations do experts provide for its refinement?

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Methodology

Design: Qualitative study using thematic analysis. Participants: Seven experts in AI and engineering education, selected via purposive sampling based on the Delphi method.

Data Collection: Semi-structured interviews conducted in person and via Zoom.

Analysis: Iterative thematic analysis with inductive and deductive coding to identify core themes and insights.

Utilization of AI in Education

- AI as a personalized tutor and tool for creating adaptive learning experiences.
- Automating routine tasks to enhance efficiency.

B. Transformation of Educational Roles and Skills

• Shift from content delivery to mentorship, focusing on critical thinking, creativity, and emotional intelligence.

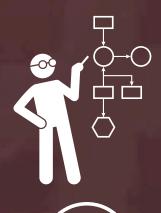


C. Ethical Considerations and Institutional Support

• Need for clear policies on AI usage and robust faculty training.

D. Future Educational Models

• Evolving curricula to integrate AI tools while preserving human-centered elements.



The AGI²E² Framework provides a structured approach to integrate AGI into engineering education, addressing the balance between technical and human-centered skills.



Expert feedback validated its relevance and feasibility, highlighting its potential to prepare students for Industry 5.0.



Ethical considerations and institutional support are critical for successful adoption of AGI technologies.



The framework emphasizes adaptability, collaboration, and practical implementation strategies to meet diverse educational needs.

Future research will expand validation efforts, incorporating diverse stakeholders and empirical testing to refine and enhance the framework's impact.

Intelligence Integration Intelligence Intelli Personalized Educational Gen Trajectories/ Dynamic Interdisciplinary (AGIIEE) Continuous \ Learning Environments Adaptation and Lifelong

21st-century

Skills

/Development /

Ethical

Considerations

Learning

Reference: Trini S Balart, Kristi J. Shryock. A Framework for Integrating Artificial General Intelligence into Engineering Education: Enhancing Human-Centric Approaches for Industry 5.0. TechRxiv. June, 2024.

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Personalized Educational Trajectories Learning at their own pace Personalized faculty development Improved academic performance

motivation enhanced Continuous Adaptation and Curriculum design

- Lifelong Learning Curriculum relevant
- and adaptable
- Continuous professional development Cultivation of a growth mindset
- and adaptability
- Resilience and positive attitude
 - Continuous industry analysis
 - Dynamic adaptive content

Ethical Considerations

Awareness of AGI's responsible use

Adaptive learning

Instant feedback

content

- Clear guidelines and policies
- Discussion of social and ethical implications of the technology
 - Ethical decision making

Tracking of individual progress Dynamic

Learner engagement and Interdisciplinary Individual preferences Learning Environments

- Multidisciplinary approaches
- Complex challenges solved
- Fostering innovative thinking
- Applied knowledge into practical contexts

21st-century Skills Development

- Relevant to the
- Industry 5.0 landscape
- Critical thinking and problem-solving skills
- Ethical judgment
- Emotional intelligence
- Use of real world
- simulations
- Creative and innovative

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