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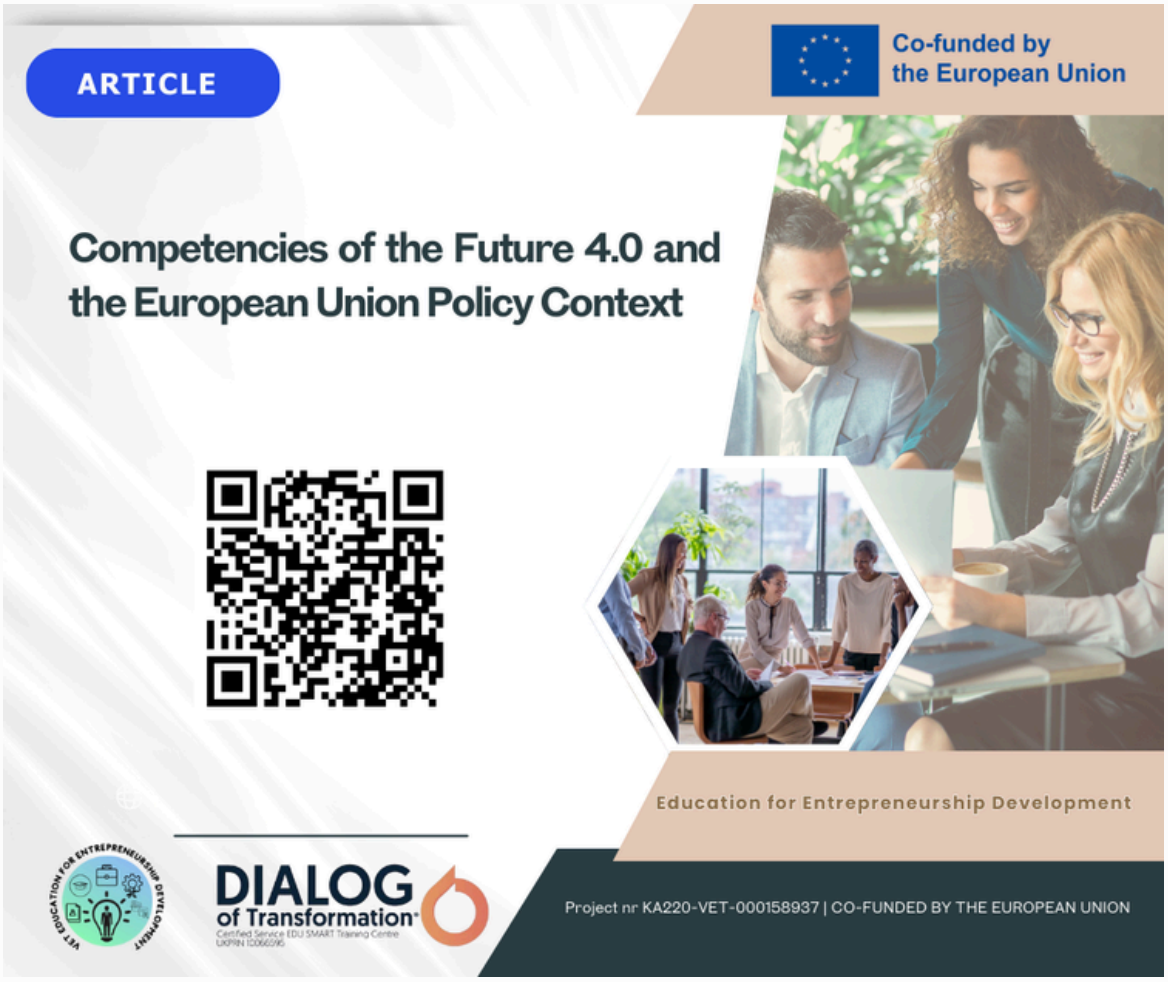

COMPETENCIES OF THE FUTURE 4.0 AND THE EUROPEAN UNION POLICY CONTEXT

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Competencies of the Future 4.0 and the European Union Policy Context

Introduction

The European Union has increasingly acknowledged the transformative impact of Industry 4.0 on workforce competencies and labor market structures. The rapid expansion of digitalization, automation, and interconnected technologies has reshaped how work is organized and performed, creating an urgent demand for a new combination of technical, digital, and social-emotional competencies. In response, the EU has implemented a range of policy initiatives aimed at addressing emerging skills gaps and preparing the workforce for future economic and societal challenges.
Industry 4.0 objectives have been integrated into EU industrial, innovation, and competition policies to support technological advancement and workforce development.

These policies emphasize research and development in digital technologies, particularly for small and medium-sized enterprises (SMEs), which represent a critical pillar of the European economy (Tvaronavičienė, 2020). The European Commission has further reinforced the importance of lifelong learning and continuous upskilling through initiatives such as the European Skills Agenda and the Digital Europe Programme, both of which aim to strengthen digital competencies across all sectors of the workforce.

Industry 4.0 and the Changing Role of Human Competencies

The implementation of Industry 4.0 technologies introduces significant challenges for employees, employers, and policymakers alike, particularly in relation to skills development and sustainable growth. As with previous industrial revolutions, the fourth industrial revolution has fundamentally altered labor market expectations and the nature of required competencies. However, what distinguishes Industry 4.0 is the central role of the human factor in a highly digitized and data-driven environment.

The widespread adoption of technologies such as cyber-physical systems, artificial intelligence, and the Internet of Things has not only transformed production processes but has also triggered profound social, organizational, and personal changes. Employees are now expected to interact with advanced digital systems, adapt to continuous technological change, and operate within increasingly complex organizational ecosystems. As a result, there is a growing demand for unprecedented competencies that enable effective participation in digitally enabled workplaces and support efficient organizational management.

Nevertheless, an emerging body of work highlights the importance of understanding human roles within digitally transformed workplaces. These perspectives emphasize that technological advancement must be accompanied by corresponding developments in competencies, organizational culture, and leadership practices to fully realize the benefits of Industry 4.0.

The Role of Education and Universities

Universities play a crucial role in aligning educational provision with the demands of Industry 4.0. Innovative approaches such as "learning factories" integrate practical, hands-on training into academic programs, enabling students to develop both technical and interdisciplinary competencies (Kipper et al., 2021). By redesigning curricula to include skills such as data analysis, critical thinking, teamwork, and problem-solving, higher education institutions contribute to narrowing the gap between academic learning and labor market needs (Tabunshchyk et al., 2021).

These efforts align closely with EU policy objectives aimed at enhancing employability, innovation, and economic resilience through education. Industry 4.0 further underscores the importance of hybrid competencies, which combine technological expertise with soft skills such as creativity, adaptability, and collaboration (Jurburg & Cabrera, 2019). This combination is particularly evident in the European ICT sector, where employees are increasingly required to integrate technical knowledge with cross-domain communication and problem-solving abilities.

SMEs, Innovation, and Policy Support

Small and medium-sized enterprises face distinct challenges in adapting to Industry 4.0 due to limited financial and human resources. Recognizing this, the EU provides targeted financial, technical, and policy support to facilitate technology adoption and workforce upskilling. Programs such as Horizon Europe promote innovation and encourage collaboration between academia, industry, and government to develop sector-specific training solutions (Walaszczyk, 2022).

Beyond economic competitiveness, the EU places strong emphasis on sustainability within the Industry 4.0 framework. Workforce development initiatives increasingly incorporate green competencies to support the objectives of the European Green Deal. This integration ensures that future competencies contribute not only to digital transformation but also to environmental responsibility and sustainable development (Poszytek, 2021).

Conclusion

The EU's response to the competencies required for Industry 4.0 reflects a comprehensive and forward-looking strategy that integrates policy, education, and industry collaboration. By addressing skills gaps through initiatives that promote hybrid competencies, practical learning environments, and sustainability-oriented training, the EU is building a workforce capable of thriving in the digital era. These efforts enhance individual employability, strengthen organizational performance, and reinforce the European Union's global competitiveness amid rapid technological and socio-economic change.

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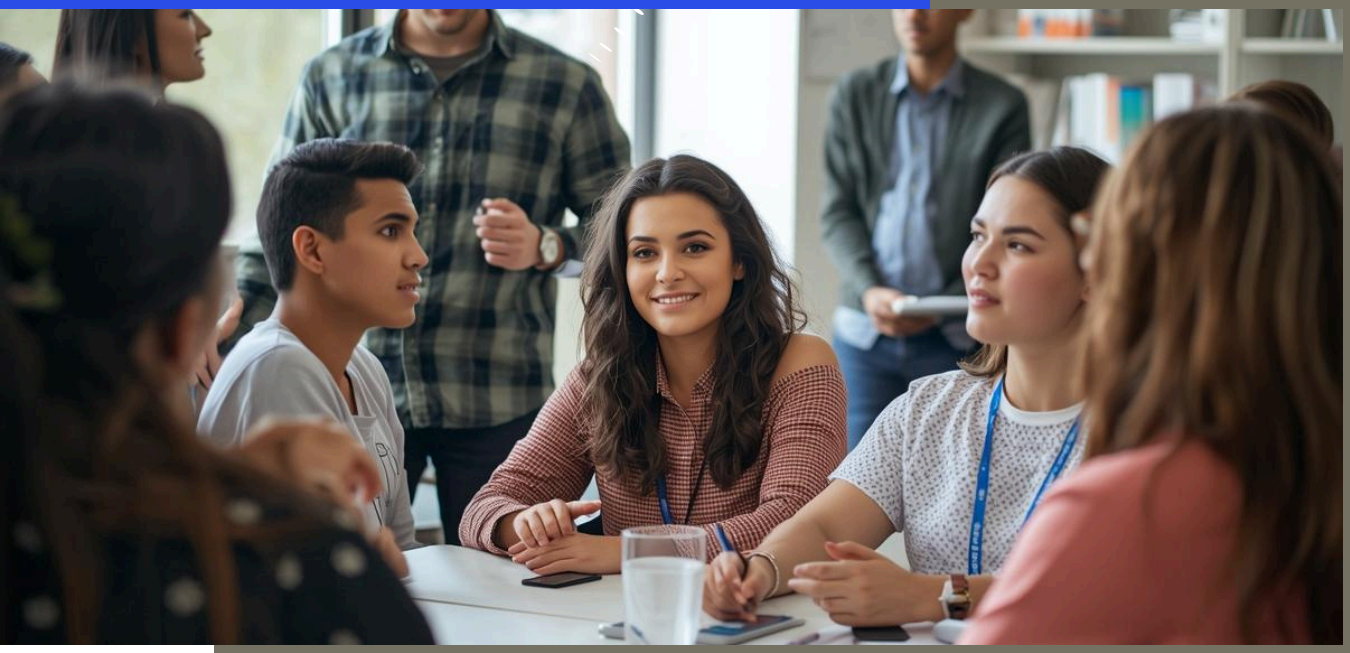

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