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THE IMPACT OF INDUSTRY 4.0 ON DEVELOPING KEY SKILLS FOR FUTURE PROFESSIONALS

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Technology has become integral to education, leading teachers and students to use it fundamentally. The widespread adoption of the Internet allowed students to access their sources of information, making learning more networked and enabling direct connections to various sources of knowledge, rather than solely relying on the exchange of information between students and teachers. Digital transformation and Education 4.0 differ from traditional education because they are enabled, supported, and guided by technology, including artificial intelligence, data management, ubiquitous technologies, robots, cloud computing, and sustainable technologies [1].

Education 4.0 refers to learning technologies associated with Industry 4.0, aimed at transforming the future of education through advanced technologies and automation. Smart technologies, artificial intelligence, and robotics are part of Industry 4.0, influencing our daily lives, becoming increasingly integrated into businesses, and leading to changes in the skills for future specialists. Due to technology's ability to maintain constant connectivity among employees, job responsibilities are becoming increasingly flexible and adaptive. Industry 4.0 is an economic shift resulting in increased globalization and rapid technological advancement that shapes how we live, learn, and work. Industry 4.0 has fueled trends like: automation and the rise of middle and high-skill jobs; intangible value in skills like leadership, communication, and design; remote work, distributed global workforces, and online, cross-cultural collaboration; digital tools in the workplace, and a partnership between humans and the internet of things IoT.

If universities want their graduates to be successful, they must prepare their students for a world in which cyber-physical systems exist across all industries. Education 4.0 represents a shift in learning technologies alongside industrial changes. For higher education institutions, this means identifying what their future graduates will need. Educators, researchers, business representatives, and government and non-government organizations have identified seven critical skills that should be central to every student's personal learning program as they prepare for a constantly evolving future workforce.

1. Problem-solving: The ability to solve problems is one of the most essential skills required by employees of any company or organization. Students who are proficient in problem-solving approach challenges with curiosity and a readiness to tackle them. Working independently or collaboratively, students analyze situations and ask questions to identify the root cause of a problem, brainstorm potential solutions, experiment and test solutions on a small scale, review test results, scale up the best solution, and continue monitoring to ensure the problem is effectively resolved. Problem-solving skills include creativity, data analysis, persistence, and critical thinking.

2. Collaboration: At its core, collaboration involves working well with others, sometimes as a team leader and other times as a team member. Collaborative students influence outcomes and are willing to change their opinions when presented with strong evidence that contradicts their initial beliefs. Effective collaborators build relationships with various personality types, employ different work styles, and act quickly to reduce tension and resolve conflicts within teams. Additionally, they communicate respectfully, whether in person, on camera, through audio, in written form (from micro-messages to long reports), or while actively listening. In 2017, Pearson Education, in collaboration with UNICEF, developed and published a report on essential 21st-century skills. The report recommends embedding three elements of collaboration into everyday classroom activities: interpersonal communication, conflict resolution, and task management. According to the report, some level of friction should be built into the learning environment to develop and practice collaboration skills. To structure a class for collaborative learning, the report recommends forming students into various groups for diverse tasks and projects, rotating roles among them to ensure all students experience different responsibilities and interpersonal dynamics, and teaching students how to respond when peers provide honest, constructive feedback. The report confirms that students with strong collaboration skills have better employment and career advancement prospects than those who lack them [2].

3. Adaptability: Adaptability is a crucial skill in Education 4.0, as it enables learners to thrive in a rapidly changing environment characterized by technological advancements and global interconnectedness. Adaptability involves the ability to adjust to new situations, technologies, and challenges. It encompasses cognitive, behavioral, and emotional adjustments, such as resilience, buoyancy, and self-regulation [3]. Educational strategies include creating self-regulated learning processes where students set goals, evaluate their progress, and adjust their strategies based on feedback. Adaptability is often taught alongside other critical skills like problem-solving and collaboration. These skills complement each other, as adaptable learners are better equipped to collaborate and solve complex problems. Adaptability

prepares students for a future where technological and societal changes are frequent. It allows them to pivot between different roles and industries, ensuring they remain relevant in the job market [3]. By fostering adaptability, Education 4.0 equips learners with the flexibility needed to navigate the challenges of Industry 4.0 and beyond [4].

Adaptability in Education 4.0 empowers learners to embrace change, innovate, and thrive in dynamic environments. It is a foundational skill that complements other essential competencies, ensuring future specialists are well-equipped to succeed in a rapidly evolving world. Digital technologies and innovative pedagogies help integrate adaptability into the curriculum, making it a core component of Education 4.0. Encouraging students to embrace change and view challenges as opportunities for growth is central to developing adaptability. This skill is essential for navigating uncertainty and making effective decisions under pressure.

Adaptive learning environments in higher education offer a dynamic approach that tailors education and support to each student's unique needs. These environments integrate technology, pedagogy, and student-centered strategies to improve learning outcomes and success. Key aspects include: a) personalized learning–adjusting content, pace, and methods to fit individual learning styles and preferences; b) data-driven learning–leveraging analytics to assess performance, behaviors, and learning patterns, enabling targeted support; c) adaptive learning technologies–utilizing intelligent tutoring systems, learning management systems (LMS), and educational software to personalize learning experiences; d) flexibility and accessibility–offering diverse formats (online, hybrid, in-person), multiple engagement modes (multimedia, interactive activities), and accommodations for students with disabilities; e) student support services–providing academic advising, tutoring, career counseling, and disability support to address academic, social, and emotional needs; f) continuous improvement–regularly refining teaching methods, technologies, and support services based on student and faculty feedback. These environments enhance a more effective and inclusive educational experience by promoting adaptability and personalization. 4.
Global Citizenship: Students develop awareness of global issues and learn to collaborate across borders through virtual reality (VR), social media, and video conferencing.

5. Innovation and Creativity: Education 4.0 fosters the ability to design solutions for complex problems by encouraging experimentation, computational thinking, and iterative design processes.

6. Technology Proficiency: Digital literacy, programming, data analysis, and familiarity with emerging technologies (e.g., IoT, AI) are central to the curriculum.

7. Lifelong Learning: This approach fosters continuous, self-directed learning to keep pace with the rapid obsolescence of knowledge and skills in modern industries. To remain competitive in the technology industry,

continuous learning is essential. It is a lifelong process crucial for staying relevant in this fast-paced field. Effective learning requires active engagement through reflection, experimentation, and the application of new knowledge and skills to real-world situations. Learning should be self-directed and driven by personal interests, curiosity, and motivation rather than imposed by external factors. Learning should be flexible and adaptable to changing circumstances, such as technological advances, social and economic changes, and personal development. As technology continues to evolve rapidly, it is crucial for technology leaders to continuously learn and adapt to emerging technologies to remain competitive and drive innovation in their work. If you have been working in the technology sector for a decade or more, you have likely amassed a wealth of knowledge and skills. However, as technology evolves, it's essential to keep learning and applying new skills to stay relevant in your field.

Thus, the emergence of Education 4.0 presents a unique opportunity to modernize educational systems, ensuring that young people are effectively prepared for Industry 4.0 while reducing educational inequalities and leveraging promising educational technologies. By emphasizing problem-solving, collaboration, and adaptability in both individual skill development and classroom learning, Education 4.0 provides young people with the best opportunity to succeed in the global economy. The learning process is reimagined as an inclusive, lifelong experience where students develop skills while teachers act as mentors.

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