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# FIRST SYNTHESIS OF RECENT RESEARCH ON 21ST CENTURY SKILLS IN HIGHER EDUCATION

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## ABSTRACT

The rapid evolution of professional, technological, and societal demands has positioned 21st century skills (SKILLS21) as essential learning outcomes in higher education. This systematic review synthesizes evidence from seventeen studies published between 2021 and 2026 to examine how these skills are conceptualized, developed, and assessed within contemporary higher-education contexts, with particular emphasis on Science, Technology, Engineering, and Mathematics (STEM) and engineering disciplines. Using a thematic synthesis approach, the review identifies strong convergence around core competencies, including collaboration, communication, creativity, critical thinking, metacognition, leadership, digital literacy, and interdisciplinary or boundary crossing abilities. The findings demonstrate that active and authentic pedagogies—such as project based learning, client sponsored work, interdisciplinary teamwork, work based learning, and technology enhanced STEM activities—are most effective in fostering these competencies when supported by intentional scaffolding and reflective practice. Assessment practices, however, remain fragmented; while rubrics and peer evaluation tools show promise, many studies rely heavily on self report measures, underscoring the need for more robust, performance based assessment frameworks. Contextual factors, including institutional resources, industry partnerships, and co curricular opportunities, significantly shape the extent to which SKILLS21 can be meaningfully integrated into curricula. Across the examined studies, authors agree that skills such as collaboration, communication, creativity, critical thinking, metacognition, leadership, digital literacy, and boundary-crossing abilities are essential for preparing graduates to navigate complex and unpredictable environments. These skills are no longer limited to disciplinary learning; they are important for fostering students' capacity to apply knowledge, solve real-world problems, and adapt to emerging challenges. Evidences indicate that active, authentic, and socially situated pedagogies are particularly effective in fostering these skills. Still, the review also reveals that the successful development of SKILLS21 depends on intentional design, structured scaffolding, and supportive institutional conditions. Without these elements, even well-intentioned pedagogical innovations may fail to produce meaningful improvements in skills. Therefore, higher education must adopt coordinated, evidence informed strategies that align curriculum design, pedagogy, assessment, and policy to ensure that graduates are equipped with the adaptable, transferable skills required to thrive in an increasingly complex world.

**Keywords** Higher education · 21st century skills · Educational practices · Literature review

## References

- [1] Birru, Y. T., The integration of 21st century skills into the higher education curriculum: Practices and perspectives—Systematic review, *Teacher Education and Curriculum Studies*, 9(3): 60–68,

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<https://doi.org/10.11648/j.tecs.20240903.12>

- [2] OECD, The future of education and skills: Education 2030, OECD Publishing, 2018.
- [3] UNESCO, Rethinking education: Towards a global common good?, UNESCO Publishing, 2015.
- [4] World Economic Forum, The future of jobs report, 2018.  
<https://www.weforum.org/reports/the-future-of-jobs-report-2018/>