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TRANSFORMING EDUCATIONAL MANAGEMENT THROUGH HYFLEX LEARNING TO FOSTER 21ST-CENTURY SKILLS IN SOCIETY 5.0

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ABSTRACT

Educational management, often narrowly perceived as classroom discipline and administrative procedures, can be redefined as a human-centered approach to foster 21st-century skills in the era of Society 5.0. This study employs a Systematic Literature Review (SLR) of research published between 2020 until 2025 to identify effective practices in nurturing students' critical thinking, creativity, collaboration, and communication. The findings reveal that strategies such as project-based learning, assigning clear roles within teams, providing constructive feedback, and integrating synchronous-asynchronous interactions in Hyflex learning environments significantly enhance learning outcomes. Moreover, attention to student well-being is essential for sustaining motivation and engagement. These practices illustrate that educational management is not limited to control and administration but serves as a framework for holistic human development. The study concludes that educators and schools should embrace the role of facilitators who not only prepare learners to navigate rapid global changes but also contribute to the realization of Sustainable Development Goal 4 (Quality Education).

Keywords: 21st-Century Skills, Educational Management, Hyflex Learning, Sustainable Development Goal 4

INTRODUCTION

We are living in a time of rapid and sweeping change, where technology no longer just supports human life but interweaves with it. The concept of Society 5.0 proposes that in its most mature form, technology should not dominate us, but rather support human flourishing, inclusion, and creativity. In this vision, every person regardless of background or circumstance has the opportunity to thrive in a "super-smart society" (Shahidi Hamedani et al., 2024).

Society 5.0 envisions a human-centered future where advanced technologies are integrated into everyday life to improve quality of life and social inclusion. This concept shifts the focus from technology for its own sake to the welfare and capabilities of people, making the development of human skills a top priority in education. Higher education and schools must therefore transform not only their pedagogies but also their educational management approaches to prepare learners for rapid social and technological change. Research on education within the Society 5.0 frame emphasizes human-centric learning that develops higher-order cognitive and socio-emotional capabilities required in the 21st century (Shahidi Hamedani et al., 2024b). In the realm of education, this shift means that teaching and learning can no longer rely solely on lecture, rote memorization, or rigid schedules. Learners must be equipped with 21st-century skills critical thinking, creativity, collaboration, and communication (the "4Cs") so they can navigate complexity, adapt to change, and co-create the future. Traditional educational management systems, which often emphasize control, standardization, and compliance, may struggle to foster such a learner-centred environment (Barr & Luo, 2025).

HyFlex (Hybrid-Flexible) learning an approach that allows students to choose between face-to-face, synchronous online, and asynchronous participation has emerged as a prominent modality that promises greater access and learner agency. Studies over the past five years report increasing adoption and research into HyFlex and hybrid models as institutions seek resilient, flexible modalities after the disruptions of the COVID-19 pandemic (Kohnke & Moorhouse, 2021). HyFlex's promise is not only logistical flexibility but also a pedagogical platform for project-based learning, collaborative tasks, and multimodal assessment that can nurture the 4Cs: critical thinking, creativity, collaboration, and communication (Wong et al., 2023).

In the context of Society 5.0, educational management must evolve from being primarily administrative toward being strategic, human-centred, and adaptive. In doing so, it should aim not just for efficiency, but for equity, engagement, and transformation. This transformation aligns with the global agenda of Sustainable Development Goal 4 (SDG 4), which calls for inclusive and equitable quality education and lifelong learning opportunities for all. By embedding HyFlex learning and adaptive management strategies, institutions can contribute to narrowing educational gaps and ensuring that no learner is left behind. Crucially, realizing the vision of Society 5.0 in education is inseparable from the pursuit of Sustainable Development Goal 4 (SDG 4), as both frameworks emphasize equitable access, learner empowerment, and the cultivation of human-centric future skills. This alignment necessitates a transformation in curricula and institutional roles, moving beyond traditional management models that prioritize compliance, scheduling, and resource allocation. Instead, contemporary management frameworks must evolve toward facilitation and distributed leadership, placing a strong emphasis on learner well-being and equity. Within this context, the HyFlex model emerges as a critical modality; the literature indicates that HyFlex extends beyond mere attendance flexibility to provide an environment that supports project-based learning, digital collaboration, and structured formative feedback. However, the efficacy of this model in fostering the 4Cs is heavily contingent upon intentional instructional design, such as clear role assignment within teams and the provision of asynchronous spaces for reflection.

A HyFlex-based paradigm offers a lens through which to reimagine management: one where students are co-designers of their learning path, where modalities are fluid, and where

resilience is built in. To explore these possibilities, this study conducts a Systematic Literature Review (SLR) of peer-reviewed publications from 2020 to 2025, or the nearest available years. The review focuses on recent research related to HyFlex learning, educational management, and 21st-century skills.The objectives of this SLR are threefold. First, it seeks to understand how HyFlex learning practices foster critical thinking, creativity, collaboration, and communication. Second, it examines how educational management must adapt to support effective HyFlex teaching and learning. Third, it identifies key barriers, enabling factors, and gaps that warrant further investigation. Through this review, the study argues that educational management should not be viewed as a rigid bureaucracy. In the context of Society 5.0, it can function as a human-centred, adaptive, and transformative scaffold that supports flexible and inclusive learning.

Recent studies have increasingly examined HyFlex and hybrid learning as responses to post-pandemic educational disruption and digital transformation. Kohnke and Moorhouse (2021) found that HyFlex learning enhances access and learner autonomy, particularly in higher education contexts. Wong et al., (2023) further demonstrated that well-designed HyFlex environments can support collaborative learning and multimodal engagement, although outcomes vary significantly depending on instructional design and institutional support (Ferreira et al., 2025). Research on 21st-century skills development also highlights the importance of project-based learning, structured collaboration, and formative feedback in fostering critical thinking, creativity, communication, and collaboration (Kohnke & Moorhouse, 2021).

However, much of the existing literature tends to focus on pedagogical strategies or technological affordances in isolation. Fewer studies explicitly examine how educational management frameworks must transform to support HyFlex learning in alignment with the human-centred vision of Society 5.0 and the equity-oriented goals of Sustainable Development Goal 4 (SDG 4). This reveals a gap in understanding how management practices such as leadership approaches, policy design, faculty support, and student well-being initiatives function as enabling or constraining factors in HyFlex-based learning ecosystems. Accordingly, this study aims to: (1) analyse how HyFlex learning practices contribute to the development of 21st-century skills; (2) examine how educational management must adapt to effectively support HyFlex implementation; and (3) identify key barriers, enablers, and research gaps in the current literature.

Theoretically, this study contributes to the literature by linking HyFlex learning with contemporary educational management theory within the context of Society 5.0 and SDG 4, thereby extending existing discussions beyond pedagogy toward systemic and managerial dimensions. Practically, the findings provide guidance for educational leaders, administrators, and policymakers in designing management strategies that support flexible learning, equity, student well-being, and sustainable educational transformation.

Literature Review

2.1 Society 5.0 and Education

Society 5.0 builds on Industry 4.0 and Education 5.0 concepts, emphasizing a smart, inclusive society where technology supports human well-being. Education for Society 5.0 requires integrated, interdisciplinary learning experiences and a focus on human-centric skills.

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Several recent syntheses highlight the necessity of rethinking curricula, assessment, and institutional roles to align with Society 5.0 principles (Kayano Fukuda, 2020; Ulf-Daniel Ehlers, 2024). Several studies emphasize that achieving the vision of Society 5.0 in education is inseparable from the pursuit of SDG 4, as both frameworks highlight equitable access, learner empowerment, and the cultivation of future-ready skills (Shahidi Hamedani et al., 2024a)

2.2 HyFlex and Hybrid Learning: Definitions and Trends

HyFlex integrates face-to-face and online learning such that students can switch modalities week-to-week or session-to-session while following the same learning outcomes. The literature shows rapid growth in HyFlex research post-2020, with reviews documenting pedagogical affordances (flexibility, inclusion), as well as recurring challenges (faculty workload, technology equity, and quality assurance). Longitudinal bibliometric and scoping reviews indicate a rise in HyFlex publications and an increasing richness of evidence about instructional design patterns (B.J. Beatty, 2019; Wong et al., 2023).

2.3 HyFlex for 21st-Century Skills

Empirical studies associate HyFlex/hybrid environments with opportunities for project-based learning, collaborative group work using digital tools, scaffolded peer feedback, and multimodal assessment all practices that can cultivate the 4Cs. However, outcomes depend strongly on instructional design: clear role assignment in teams, structured synchronous sessions for discussion, and asynchronous spaces for reflection and creative production are recurring success factors (Kain et al., 2024; Koohfar et al., 2023; Sarah K. Howard et al., 2021).

2.4 Educational Management: From Control to Facilitation

Traditional educational management models emphasize compliance, scheduling, and resource allocation. Contemporary frameworks emphasize facilitation, distributed leadership, and attention to learner well-being and equity. In HyFlex contexts, managers must balance infrastructure provisioning (bandwidth, LMS tools), staff development (digital pedagogy), and policies that encourage flexible assessment and student choice (Wong et al., 2023).

RESEARCH METHODS

This study employed a Systematic Literature Review (SLR) approach to synthesise existing empirical and review-based evidence on HyFlex learning, educational management, and the development of 21st-century skills within the context of Society 5.0. The SLR method was selected to ensure a transparent, replicable, and rigorous process for identifying, screening, and analysing relevant peer-reviewed studies (Hjetland et al., 2020). This approach is appropriate for mapping research trends, identifying conceptual patterns, and highlighting gaps across a rapidly evolving body of literature. The review process followed a structured sequence consisting of identification, screening, eligibility assessment, and inclusion, as illustrated in Figure 1. First, an initial search was conducted across multiple academic databases. Second, duplicate records were removed. Third, titles and abstracts were screened based on predefined inclusion and exclusion criteria. Finally, full-text articles were assessed for eligibility before being included in the final synthesis.

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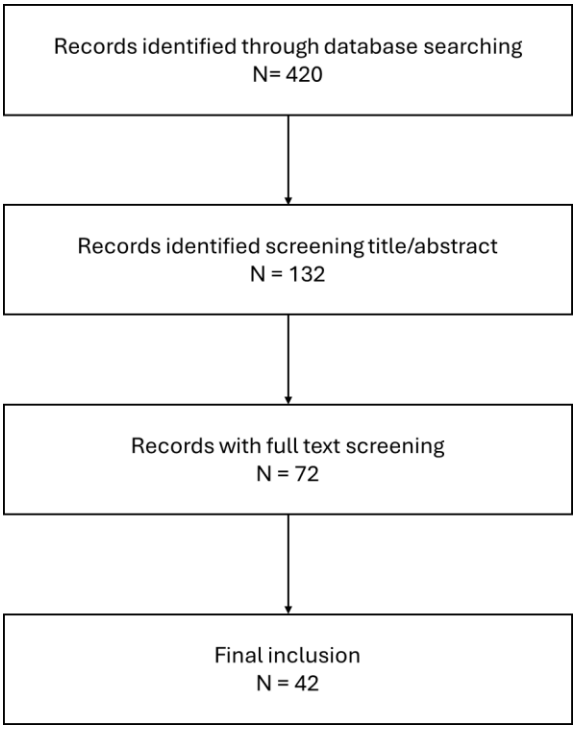

Figure 1. Procedures for search and selection of relevant publications.

The primary materials for this study were peer-reviewed journal articles and systematic review papers. The databases searched included Scopus, ScienceDirect, SpringerLink, MDPI, and other major academic publishers to ensure comprehensive coverage of international research. A structured search string was used, combining keywords such as: "HyFlex," "hybrid learning," "21st-century skills," "critical thinking," "collaboration," "Society 5.0," and "educational management." To support consistency during screening and analysis, a data extraction matrix was developed. This matrix recorded key information from each article, including publication year, research context, methodological approach, HyFlex features, instructional strategies, management implications, reported outcomes, and identified challenges.

RESULTS AND DISCUSSION

Results

From the included studies, five interrelated themes emerged as central to HyFlex implementations that effectively foster 21st-century skills.

4.1 Intentional Instructional Design (Project-Based & Problem-Based Learning)

Project-based learning (PBL) consistently appears as a strong vehicle for critical thinking and creativity in HyFlex environments. Studies show that when HyFlex courses incorporate sustained projects with authentic problems, students engage in higher-order inquiry and produce creative artifacts across modalities. HyFlex supports varied contribution formats such as video presentations, collaborative documents, and in-class prototypingwhich enrich divergent thinking processes. These varied formats allow students to approach problems from multiple perspectives and select modes of expression aligned with their strengths. As a result, learners are not constrained to a single representation of knowledge, but instead engage in

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exploration, experimentation, and iterative refinement of ideas across synchronous and asynchronous settings. This flexibility encourages originality while maintaining alignment with shared learning outcomes.(Mahande et al., 2024)

4.2 Structured Collaboration with Clear Roles

Designing team work with explicit roles (leader, researcher, communicator, synthesizer) improves equitable participation and supports collaboration and communication skill development. Multiple papers report that role clarity prevents "lurking" in online modalities and helps instructors manage assessment fairly across modalities (Ferreira et al., 2024)

4.3 Synchronous–Asynchronous Integration

Hybrid models that intentionally blend synchronous interaction (for discussion, negotiation, peer review) and asynchronous tasks (for reflection, creative work) report better outcomes in critical thinking and communication. HyFlex affords modalities to match task demands: discussions online or in-person, and portfolio work in asynchronous channels. Effective educational management formalizes schedules and protocols for when to use each mode (Wong et al., 2023)

4.4 Formative Feedback and Assessment Strategies

Frequent, formative feedback (peer and instructor) delivered through multiple channels enhances students' capacity to iterate their work and deepen analysis. Assessment rubrics that transcend modality (i.e., assess process and product, not attendance mode) are important management tools to ensure fairness and focus on learning outcomes.

4.5 Well-Being, Equity, and Faculty Readiness

Multiple studies warn that HyFlex may exacerbate inequities (digital divide, time burdens) if not managed carefully. Student well-being (mental health, workload balance) is repeatedly identified as central to engagement; educational management must therefore integrate student support, workload policies, and faculty training. Administrators play a critical role resourcing technology, professional development, and student support services (Wong et al., 2023).

Discussion

The findings of this review demonstrate that HyFlex learning can foster 21st-century skills effectively when supported by intentional educational management. Rather than functioning merely as a flexible delivery model, HyFlex operates as a pedagogical ecosystem in which learning design, managerial decisions, and learner agency are closely intertwined. This reinforces the argument that flexibility alone is insufficient; meaningful outcomes depend on how flexibility is structured, guided, and supported.

Instructional Design as a Scaffold for Learner Agency

The prominence of project-based learning and structured collaboration in the results aligns with constructivist and student-centred learning theories, which emphasise active knowledge construction through authentic tasks. Beatty's (2019) conception of HyFlex as a learner-directed philosophy is particularly relevant here. The reviewed studies indicate that PBL in HyFlex settings enables learners to exercise choice not only in participation mode, but also in problem-solving pathways and knowledge representation. Educational management

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plays a critical role in this process by ensuring curricular coherence, aligning assessment criteria across modalities, and providing instructors with the autonomy to design flexible yet purposeful learning experiences (Mahande et al., 2024).

From Administrative Control to Pedagogical Facilitation

The integration of synchronous and asynchronous modalities highlights a fundamental shift in educational management from control-oriented practices toward facilitation and orchestration. Consistent with Barr and Luo (2025), the findings suggest that effective HyFlex implementation requires managers to balance infrastructure provision with pedagogical leadership. For example, asynchronous activities allow students time for reflection and idea development, while synchronous sessions function as spaces for dialogue, feedback, and negotiation of meaning. This deliberate orchestration supports deeper critical thinking and communication, illustrating how management decisions directly influence cognitive engagement.

Collaboration, Equity, and the Human-Centred Lens of Society 5.0

The emphasis on clear role assignment within collaborative tasks underscores the importance of structured support in preventing unequal participation. This finding resonates with socio-cultural learning perspectives, which view learning as a socially mediated process requiring intentional design. In the context of Society 5.0, such structures are essential to ensure that technological flexibility does not exacerbate inequities. The review further indicates that learner well-being and faculty readiness are not peripheral concerns, but core components of sustainable HyFlex implementation. Educational management must therefore prioritise policies related to workload balance, mental health support, and professional development to uphold the human-centred values embedded in both Society 5.0 and SDG 4 (Bond et al., 2020).

Implications for Educational Management Theory and Practice

Taken together, these findings extend existing HyFlex literature by foregrounding educational management as a mediating force between technology and pedagogy. Rather than positioning management as a background administrative function, this review conceptualises it as an enabling framework that shapes learning conditions, equity, and skill development (Ehlers, Ulf-Daniel ; Eigbrecht, 2024). This perspective contributes theoretically by integrating HyFlex learning into contemporary discussions of adaptive and distributed leadership. Practically, it offers guidance for institutions seeking to design flexible learning systems that are pedagogically meaningful, socially inclusive, and aligned with future-oriented educational goals (Bush, 2020).

CLOSING

This study confirms that the HyFlex learning model plays a strategic role in transforming education management to support 21st-century skills in the Society 5.0 era. Successful implementation is strongly influenced by digital infrastructure readiness, educators competency, student readiness, and engagement-centered learning strategies. HyFlex has been proven to improve learning satisfaction, academic achievement, and classroom inclusiveness, but challenges such as technological gaps, policy limitations, and educator training still need to be addressed. Therefore, policies that are integrated with infrastructure development, digital equity, and educator capacity building are needed. With the right support, HyFlex can become a pedagogical innovation that promotes equity, resilience, and adaptive education management

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in the Society 5.0 era. Limitations include potential publication bias toward English-language journals and the heterogeneity of HyFlex definitions across studies. Future empirical research should focus on longitudinal outcomes of HyFlex PBL on creativity and critical thinking, comparative studies across cultural contexts, and experimental designs examining management interventions (e.g., role frameworks, rubric designs).

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