INTERDISCIPLINARY APPROACH WITH S.M.A.R.T. MANAGEMENT ADVOCATING HIGHER-ORDER THINKING IN PRIMARY SCHOOL STUDENTS

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Abstract. The introduction of the Kurikulum Bersepadu Sekolah Rendah (KBSR) in 1983 marked a significant shift in Malaysia's primary education system, which later evolved into the Kurikulum Standard Sekolah Rendah (KSSR) to meet contemporary educational needs. Despite these advancements, concerns persist regarding the curriculum's effectiveness in developing higher-order thinking skills and adequately preparing students for global challenges. Although the curriculum emphasizes student-centred learning strategies, including problem-solving, project-based tasks, and continuous assessments, stakeholders continue to question its capacity to equip students for the complexities of the 21st century. This paper explores the potential of an interdisciplinary approach, integrated with S.M.A.R.T. (Synthesizing, Meta-knowledge, Advancement, Reflective Integration, and Trans-disciplinary) management, to enhance cognitive development by fostering connections across diverse knowledge areas. Interdisciplinary education, increasingly recognized for promoting comprehensive understanding and innovative problem-solving, encourages students to develop meta-knowledge by synthesizing various perspectives. When combined with S.M.A.R.T. management, this approach aims to provide educators and students with the necessary tools to achieve a deeper understanding and balanced judgment, ultimately addressing existing gaps in the current curriculum and better-preparing students for the modern world.
Keywords: *interconnection, interdisciplinary, multidisciplinary, integration, approaches, thinking*

Introduction

With the rapid expansion of knowledge today, the boundaries between disciplines are becoming less distinct, making it challenging for students to recognize the connections between different fields of study. Addressing complex social challenges requires the collaboration of physical scientists, social scientists, humanities scholars, and engineers, underscoring the inherently interdisciplinary nature of such endeavors. There is an urgent need to cultivate a new generation of students who possess deep expertise in their respective disciplines while also being adept at working across disciplinary boundaries in interdisciplinary teams. These competencies extend beyond traditional disciplinary frameworks, emphasizing the importance of interdisciplinary programs that focus on addressing persistent, long-term challenges rather than being confined to academically defined disciplinary boundaries. Interdisciplinary approaches are critical for future competitiveness, as knowledge creation and innovation often occur at the intersection of disciplines, thereby enriching educational programs to equip students with a comprehensive understanding of diverse roles and problem-solving strategies across various fields. Research, literature reviews, and curriculum development initiatives consistently highlight the importance of interdisciplinary learning, which involves integrating experiences, skills, and outcomes across different educational domains (Klaassen, 2018). This approach provides learners with a robust framework for understanding and applying knowledge across multiple contexts.

Conceptualization of interdisciplinary studies can be divided into three key components. First, Klein defines interdisciplinarity by highlighting its role in bridging disciplinary divides, distinguishing it from multidisciplinary, pluri-disciplinary, and trans-disciplinary approaches. Multidisciplinary efforts involve various disciplines addressing the same issue with limited interaction, whereas pluri-disciplinary endeavors engage disciplines based on external contributions from other fields. In contrast, trans-disciplinary initiatives are characterized by their alignment with a comprehensive overarching vision. Second, Klein's framework explores the strategies employed by interdisciplinary approaches to achieve their goals. Within this context, Klein identifies two primary motivations for pursuing interdisciplinary programs: the inherent limitations of disciplinary approaches and the need for disciplines to incorporate insights from other fields to advance. Finally, Klein's model addresses the contemporary application of interdisciplinary initiatives across various domains, including industry, healthcare, and secondary or post-secondary education (Davies et al., 2010). This aspect is crucial for all interdisciplinary methodologies, as it enhances learners' ability to navigate learning-related challenges. A key component of this ability is the learner's capacity to recognize similarities in the approaches of different disciplines toward interdisciplinary issues, and more importantly, to appreciate and integrate the diverse epistemologies that various disciplines contribute to interdisciplinary problem-solving (Roy, 2000). Empirical evidence suggests that interdisciplinary approaches facilitate the development of a distinct theoretical, conceptual, and methodological identity. Consequently, findings from interdisciplinary research tend to be more cohesive and integrated (Van Den Besselaar, 2019).

Literature review

The evolving educational landscape in the 21st century has increasingly highlighted the need for interdisciplinary approaches in teaching and learning, particularly at the primary level where foundational cognitive skills are developed. Traditional disciplinary boundaries are becoming less distinct, making it essential for students to acquire skills that allow them to integrate and apply knowledge across various fields. This integration is crucial for addressing the multifaceted challenges of the modern world, which require solutions that draw on diverse perspectives and expertise (Augsburg and Henry, 2009). In response to these demands, interdisciplinary education has gained prominence as a method to foster critical thinking, problem-solving, and innovation among students from an early age (Nguyen and Thai, 2023). The literature review covers the following core of the conceptional approach, providing a critical examination of interdisciplinary teaching methods and their application in primary education. Key themes explored in the literature include as below.

Interdisciplinary education and its importance

Interdisciplinary education integrates concepts and methodologies from various academic disciplines to offer students a more comprehensive and cohesive understanding of complex challenges. This approach is important because it nurtures critical thinking, innovation, and the ability to solve multifaceted problems by encouraging students to draw connections between various disciplines, which is essential in today's interconnected world. Interdisciplinary education encourages the synthesis of ideas across different domains, enabling students to develop a more holistic

understanding of complex issues. Klein (1990) offers a comprehensive framework for understanding interdisciplinarity, differentiating it from related concepts such as multidisciplinarity and transdisciplinarity. Interdisciplinarity involves the active integration of multiple disciplines to address problems in a way that transcends the limitations of individual fields. Unlike multidisciplinarity, where disciplines work side by side without significant interaction, and transdisciplinarity, which aims for an overarching synthesis, interdisciplinarity actively bridges gaps between distinct fields, promoting the creation of new knowledge and innovative solutions (Klein, 1990)). Research has shown that interdisciplinary approaches are particularly effective in primary education, where students are in the early stages of developing their cognitive and problem-solving skills. By encouraging students to draw connections between different subjects, interdisciplinary education fosters a deeper understanding of how various fields intersect and influence one another (Klaassen, 2018). This approach not only enhances students' ability to think critically but also prepares them for future challenges that require integrated knowledge and adaptive thinking.

S.M.A.R.T. management in interdisciplinary education

S.M.A.R.T. management involves setting goals that are Specific, Measurable, Achievable, Relevant, and Time-bound. In the context of interdisciplinary education, this approach helps in structuring and guiding the learning process, ensuring that educational activities are clearly defined, focused, and aligned with the intended learning outcomes. This method enhances the effectiveness of interdisciplinary teaching by providing a clear framework for both teachers and students. To effectively implement interdisciplinary approaches in education, it is essential to have a structured framework that guides the integration of various disciplines. The S.M.A.R.T. (Synthesizing, Meta-knowledge, Advancement, Reflective Integration, and Trans-disciplinary) management framework has emerged as a powerful tool for enhancing interdisciplinary education. S.M.A.R.T. management emphasizes the synthesis of knowledge from different fields, encouraging students to develop meta-knowledge that allows them to understand and integrate diverse perspectives. This framework also advocates for the advancement of interdisciplinary learning through reflective integration, where students critically assess how different disciplines contribute to a comprehensive understanding of complex issues (Nguyen and Thai, 2023). The application of S.M.A.R.T. management in primary education is particularly significant, as it provides a structured approach to fostering interdisciplinary thinking from an early age. By integrating this framework into the curriculum, educators can help students develop the skills needed to navigate the complexities of modern life, where knowledge and innovation often emerge at the intersections of different fields. This approach aligns with the goals of the KSSR curriculum, which aims to equip students with the cognitive tools necessary to succeed in a rapidly changing world (Devan, 2021).

Challenges and opportunities

Implementing interdisciplinary education comes with challenges such as the difficulty of integrating multiple subjects, the need for educators to develop new teaching strategies, and the potential for increased workload. However, these challenges also present opportunities, such as enhancing students' ability to think critically across different areas of knowledge, fostering collaboration among educators, and preparing

students for complex, real-world problems that require an interdisciplinary approach. While the benefits of interdisciplinary education are well-documented, its implementation presents several challenges. One of the primary obstacles is the entrenched nature of disciplinary silos within educational institutions, which can make it difficult to develop and sustain interdisciplinary programs. Moreover, the success of interdisciplinary education depends heavily on the ability of educators to effectively implement these approaches. This requires ongoing professional development and support for teachers, enabling them to navigate the complexities of interdisciplinary teaching and to utilize frameworks like S.M.A.R.T. management effectively (Roy, 2000). Despite these challenges, the growing recognition of the value of interdisciplinary approaches presents significant opportunities for innovation in education. By overcoming the barriers posed by traditional disciplinary boundaries and adopting frameworks like S.M.A.R.T. management, educational institutions can better prepare students for the demands of the 21st century. This preparation is crucial not only for individual student success but also for fostering a more adaptable and innovative workforce capable of addressing global challenges (Van Den Besselaar, 2019).

Curriculum integration

Curriculum integration is the process of combining different subjects into a cohesive learning experience that mirrors the interconnectedness of knowledge in real life. This approach allows students to see the relationships between different fields and apply their learning in a more holistic way. Effective curriculum integration requires careful planning and coordination among educators to create meaningful and relevant learning experiences that engage students and deepen their understanding.

Materials and Methods

Conceptual framework

This paper is grounded in a conceptual framework that integrates interdisciplinary learning with the S.M.A.R.T. management approach within the context of the Malaysian KSSR curriculum. The framework is built upon the premise that effective interdisciplinary education fosters higher-order thinking skills, creativity, and problem-solving abilities by synthesizing knowledge across different domains. The S.M.A.R.T. management model is adapted to guide the implementation of this approach, ensuring that educational goals are Specific, Measurable, Achievable, Relevant, and Time-bound.

Research design

As a conceptual paper, this study does not rely on empirical data collection but instead synthesizes existing literature, theories, and best practices in interdisciplinary education. The research design involves a thorough analysis of scholarly articles, curriculum guidelines, and educational theories that support the integration of interdisciplinary approaches within primary education. The study draws upon relevant frameworks and models to propose a structured methodology for incorporating the S.M.A.R.T. management approach into the KSSR curriculum. This conceptual paper is guided by the following objectives: (1) To assess the current interdisciplinary content in primary education and its impact on teaching methodologies; (2) To propose the

integration of S.M.A.R.T. management into the KSSR curriculum to address identified gaps; and (3) To evaluate the effectiveness of interdisciplinary teaching in fostering students' cognitive development and higher-order thinking skills.

Theoretical description of interdisciplinary curriculum

The pursuit of goals and objectives aimed at societal improvement is a fundamental aspect of human endeavor. These objectives define our responsibilities, particularly in the context of national and professional tasks that benefit society, including the development of children. To achieve these objectives effectively, the adoption of the S.M.A.R.T. goal-setting framework-an approach often linked to Peter Drucker's management by objectives-is recommended. This method provides a structured and measurable approach to goal setting, simplifying the evaluation process and facilitating the assessment and recognition of performance (Locke and Latham, 2019). The S.M.A.R.T. framework, which stands for 'Specific', 'Measurable', 'Achievable', 'Relevant', and 'Time-bound', is instrumental in ensuring that goals are clearly defined and progress is easily tracked. Instead of vague aspirations, S.M.A.R.T. goals provide clear, verifiable pathways to achieving specific outcomes, with concrete indicators of success. This approach aligns well with the principles of the national Kurikulum Standard Sekolah Rendah (KSSR) curriculum in Malaysia, which aims to enhance interdisciplinary thinking among educators and expand their knowledge base (Almahameed, 2018).

Building on the S.M.A.R.T. criteria, this conceptual framework seeks to enhance the proposed expert system, which integrates interdisciplinary and multidisciplinary approaches while maintaining the integrity of the KSSR curriculum. The model incorporates various facets of school management, taking into account local factors such as the specific needs of teachers, students, school administration, stakeholders, and educational departments. By utilizing underexploited resources and expertise, the expert system is designed to promote more action-oriented practices, ultimately aiming to improve the performance of both students and teachers (Marsh et al., 2017). The proposed expert system's integrated design is expected to add significant value to the educational process, starting at the primary school level and contributing to the development of graduates equipped with the skills necessary to meet the evolving demands of the global job market (Repko and Szostak, 2020) (*Figure 1*).

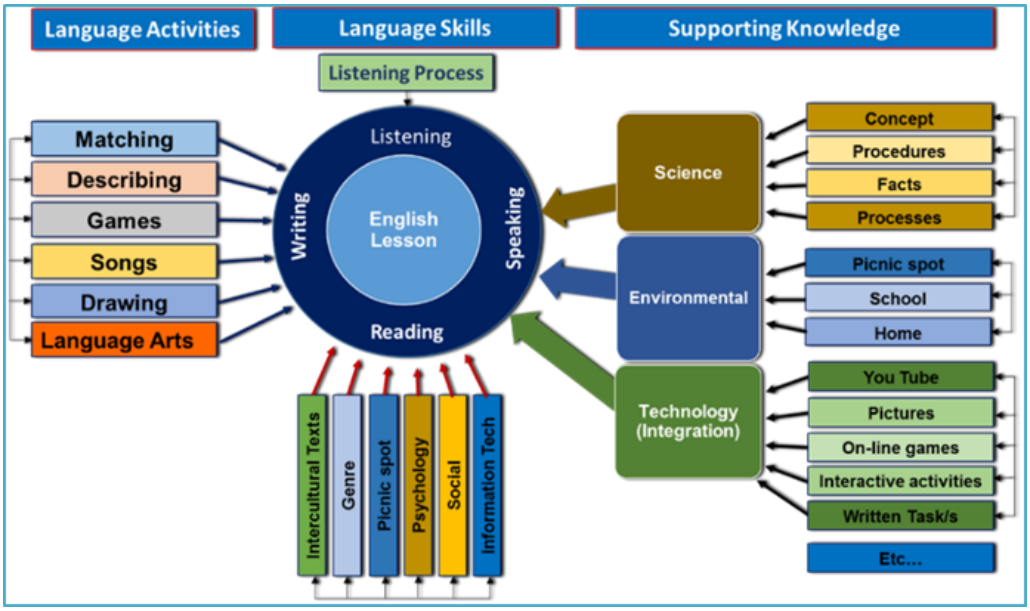

Figure 1. *Suggested interdisciplinary approach that accommodates 21st-century skills in teaching and learning: Collaboration, communication, creativity, and critical thinking.*

This concept paper promotes the use of S.M.A.R.T. goals-a widely recognized framework that stands for 'Specific', 'Measurable', 'Achievable', 'Relevant', and 'Time-bound'. This framework provides a clear structure for setting and achieving objectives, making it easier to monitor progress and ensure goals are met effectively. Recent research highlights that S.M.A.R.T. goals are particularly valuable in breaking down complex tasks into manageable parts, thereby enhancing communication and focus within educational settings (Locke and Latham, 2019). The application of S.M.A.R.T. goals has been well-received in various educational contexts, where it has been shown to support structured and goal-oriented. The interdisciplinary approach highlighted here emphasizes the core skills essential for 21st-century teaching and learning: collaboration, communication, creativity, and critical thinking. These skills are central to fostering an integrated learning environment where students can engage in activities that bridge diverse disciplines. This approach is not only consistent with the objectives of the current Kurikulum Standard Sekolah Rendah (KSSR) but also aligns with the principles of the previous Kurikulum Bersepadu Sekolah Rendah (KBSR), both of which advocate for a holistic and interconnected educational experience.

The activities proposed within this interdisciplinary framework can be seamlessly integrated into the curriculum to offer students a more comprehensive understanding of various topics. By embedding these activities with technological integration, educators can further enhance innovation and promote a dynamic learning environment. This integration helps students appreciate the interconnectedness of different subjects and highlights the importance of their learning across multiple dimensions. The interdisciplinary mapping described above focuses on three primary forms of integration: language activities integration, language skills integration, and supporting knowledge integration. These forms of integration provide educators with the tools to merge various disciplines and skills into a cohesive body of knowledge, thereby supporting a wide range of cognitive development. Such an approach ensures that students not only acquire knowledge across different subjects but also develop the ability to apply this knowledge in a practical, interdisciplinary context.

Results and Discussion

Challenges in KSSR practices among teachers and students

The Primary School Standard Curriculum (KSSR) marks a significant advancement from the earlier Primary School Integrated Curriculum (KBSR), with the intent of cultivating creative, critical, and innovative thinking among students. This curriculum aims to prepare students to navigate future global challenges by necessitating changes in teaching methods, organizational structures, time management, subject offerings, assessment strategies, learning materials, and overall curriculum management within schools. The core objective of KSSR is to ensure that students not only acquire knowledge but also develop the ability to apply it in real-world contexts beyond the classroom (Almahameed, 2018). However, research has suggested that the fragmented nature of school curricula may impede the effective integration of topics into a cohesive body of knowledge that enhances students' problem-solving abilities. For instance, the findings from international assessments such as TIMSS and PISA have highlighted the need to re-evaluate educational content, curriculum frameworks, pedagogical approaches, and school practices in Malaysia to better meet the demands of a rapidly evolving global landscape.

In the context of 21st-century education, teaching and learning must be dynamic, engaging, and goal-oriented. Recent studies emphasize the critical role of motivation in learning, noting that students' interests and goals are significant factors that influence their engagement and academic achievement. To effectively meet the needs of digital natives, educators must adapt to new roles, equipping themselves with the necessary knowledge, confidence, and resources to implement Technological Pedagogical Content Knowledge (TPACK) effectively (Koehler et al., 2013). Moreover, the complexities of the modern job market underscore the importance of interdisciplinary instruction, which promotes both interdisciplinary and multidisciplinary thinking from an early age. Interdisciplinary education involves integrating concepts and principles from various disciplines to develop a comprehensive analytical framework. This approach aligns with constructivist theories, which posit that learners actively construct knowledge through experiences that foster interdisciplinary thinking and skill development (Repko and Szostak, 2020).

Reviewing the use of interdisciplinary application in teaching and learning

The interdisciplinary approach is distinct from multidisciplinary methods in that it transcends traditional disciplinary boundaries, allowing for the integration of multiple subject areas into a cohesive learning experience. This integration empowers students to engage with various disciplines simultaneously, facilitating the synthesis of disparate knowledge into a unified understanding. As globalization accelerates and knowledge becomes more interconnected, educational content and pedagogical methods must adapt to reflect these changes (Andersone and Helmane, 2018). Recent studies emphasize the importance of incorporating interdisciplinary thinking into course design to promote active learning and engagement. For instance, integrating interdisciplinary habits of mind within the curriculum fosters a more dynamic and comprehensive educational experience. Furthermore, the alignment of interdisciplinary subject creation with current educational frameworks is crucial for providing students with impactful and meaningful learning opportunities. The appeal of interdisciplinary education is growing across all levels of education, from early childhood programs to graduate studies. When

effectively implemented, interdisciplinary education is regarded as one of the most powerful methods for advancing knowledge in today's complex world. Practitioners and educators who embrace this approach recognize its potential to address contemporary issues and meet evolving real-world challenges. Higher education institutions, in particular, play a vital role in fostering environments that support interdisciplinary collaboration and ongoing innovation (Davies et al., 2010).

Challenges in implementation KSSR practices: Perspectives from teachers and students

The Primary School Standard Curriculum (KSSR) represents a significant evolution from the previous Primary School Integrated Curriculum (KBSR), aiming to develop students' abilities in critical thinking, creativity, innovation, and complex problem-solving. This curriculum is designed to prepare students to meet the demands of the globalized world, requiring transformations in pedagogical practices, school organization, time allocation, subject offerings, assessment techniques, instructional materials, and overall curriculum management. KSSR emphasizes not just the acquisition of knowledge but also its practical application beyond the classroom setting. Despite these advancements, some studies suggest that the compartmentalized nature of school curricula may inhibit the integration of knowledge across different subjects, thus limiting students' ability to form a cohesive understanding that enhances their problem-solving skills (Devan, 2021). In particular, findings from international assessments such as TIMSS and PISA highlight the need for Malaysia's education system, which traditionally emphasizes examinations, to reassess and potentially redesign its educational content, curriculum frameworks, pedagogical strategies, and school practices to better equip students for the challenges of the 21st century (Nguyen and Thai, 2023).

In line with contemporary educational imperatives, effective teaching and learning in the 21st century must be both engaging and goal-oriented. Current research underscores the importance of aligning educational practices with students' interests and goals to enhance motivation and achievement. To meet the expectations of today's digitally literate students, teachers need to adopt new roles and acquire the necessary knowledge, confidence, and resources, especially as technological and pedagogical content knowledge continues to evolve rapidly (Locke and Latham, 2019). Moreover, the current job market demands underscore the significance of interdisciplinary education, which encourages students to integrate concepts and principles from various fields to build a more comprehensive and nuanced understanding of the world. This approach, grounded in constructivist theory, supports the idea that learners actively construct knowledge and meaning through their experiences, particularly when engaging with interdisciplinary thinking and skill development (Marsh et al., 2017). Through this analysis, the research identifies the potential for integrating interdisciplinary approaches with S.M.A.R.T. management to address identified gaps in the KSSR curriculum, particularly in fostering students' higher-order thinking skills.

Creating interdisciplinary teams for S.M.A.R.T. goals

Thespecific goals are more likely to be achieved than general ones, as they provide clear metrics that allow learners to track their progress and recognize their achievements. This focus on measurable outcomes enhances the learning process by

fostering a sense of accomplishment. Recent studies emphasize that to effectively implement interdisciplinary approaches, there should be a strong focus on developing both teachers' and students' Pedagogical and Technological Content Knowledge (TPACK). Ensuring that this development is supported with appropriate strategies and techniques is crucial for acquiring the necessary skills and experiences that align with the objectives of the Kurikulum Standard Sekolah Rendah (KSSR) curriculum (Almahameed, 2018; Koehler et al., 2013). Building effective interdisciplinary teams involves cultivating a shared understanding of the S.M.A.R.T. (Specific, Measurable, Achievable, Relevant, Time-bound) goals framework. This shared understanding enables educators to create a cohesive and collaborative learning environment that supports the diverse needs of students while aligning with the broader educational goals set forth by the KSSR. The integration of S.M.A.R.T. goals within interdisciplinary teams not only enhances goal attainment but also promotes a more structured and reflective approach to teaching and learning (Repko and Szostak, 2020; Marsh et al., 2017).

Effectiveness of collaborative, interdisciplinary teams in schools

The formation of collaborative interdisciplinary teams in schools presents several challenges, particularly concerning the diversity of expertise, the physical and mental demands on educators, and the transition from traditional teaching methods to interdisciplinary approaches. Teachers assigned to these teams often experience a significant shift from working in isolation within their classrooms to engaging in a more collaborative environment. This shift necessitates teamwork, continuous professional communication, and, in some cases, interaction with subject specialists or School Improvement Specialist Coaches (SISC) who are focused on enhancing educational standards (Almahameed, 2018). Although these challenges are considerable, involvement in such collaborative endeavors fosters the professional growth of teachers, better equipping them to meet the demands of 21st-century education, especially in a landscape increasingly populated by digital natives. Collaborative environments encourage teachers to learn from one another, work together effectively, share responsibilities equitably, and set realistic, achievable goals (Flowers et al., 1999).

Recent studies suggest that participation in professional teaming has a positive impact on various aspects of school life. For instance, teachers who engage in collaborative teams report a more positive school climate, increased parental involvement, higher job satisfaction, and noticeable improvements in student motivation and academic achievement. These findings highlight the importance of fostering collaborative, interdisciplinary teams within educational institutions to enhance both teaching effectiveness and student outcomes. Teachers generally view the interdisciplinary approach favorably, acknowledging its potential to significantly enhance student learning and achievement. Despite the inherent challenges of adopting this method, many educators express confidence in their ability to implement interdisciplinary strategies effectively. This approach is increasingly recognized as a valuable tool for integrating various disciplines and skills, offering students a more holistic and enriched educational experience.

Conclusion

In conclusion, the interdisciplinary approach in education holds great promise for fostering comprehensive student development. By bridging multiple disciplines, it equips students with a diverse set of skills and knowledge that are essential for success in the modern world. Teachers' positive perceptions and confidence in implementing this approach suggest that, with the right support and resources, interdisciplinary education can play a crucial role in enhancing student outcomes. As education continues to evolve to meet the demands of the 21st century, the interdisciplinary method will likely become an integral component of effective teaching and learning practices, contributing to the overall progress and achievement of students.

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Conflict of interest

I hereby, confirm that there is no conflict of interest involve with any parties in this research study.

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