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PREFACE

It is with great pleasure that we welcome all participants to the International Conference on "Innovating Education and Social Science for a Sustainable Future", held on 5th July 2025 at the Faculty of Education, Thaksin University, Thailand.

This conference serves as a platform for scholars, researchers, educators, and practitioners from diverse disciplines to share knowledge, exchange innovative ideas, and explore practical solutions in the fields of education and social sciences. In today's rapidly changing world, education and social development are crucial foundations for building a sustainable future. By fostering collaboration across cultures and academic perspectives, this event aims to generate new insights that can guide both policy and practice.

The Faculty of Education, Thaksin University, is committed to advancing research and innovation that address the challenges of our time. Through this conference, we hope to inspire meaningful dialogue, encourage the development of innovative models, and strengthen international cooperation.

On behalf of the organizing committee, we would like to extend our sincere gratitude to all keynote speakers, presenters, participants, and supporters whose contributions make this conference possible. We are confident that the discussions and ideas exchanged here will inspire future research, collaboration, and action towards achieving a more sustainable world.

We wish you all a successful and enriching conference experience.

Faculty of Education
Thaksin University
5th July 2025

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Self-Directed Learning as a Foundation for 21st Century Skills Development in Primary Education

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Abstract

The demands of the 21st century—marked by technological advancement, globalization, and dynamic labor markets—have prompted a global emphasis on competencies like critical thinking, creativity, communication, and collaboration, commonly known as the "4Cs." To cultivate these skills in learners from an early age, education systems are increasingly turning to self-directed learning (SDL), a pedagogical approach that emphasizes autonomy, responsibility, and reflection.

SDL, defined as a process where learners take the initiative to assess their learning needs, set goals, seek resources, and evaluate outcomes (Knowles, 1975), aligns well with constructivist theories of learning. Though traditionally applied in adult education, SDL is proving valuable in primary education for developing metacognitive skills, learner agency, and adaptability. Through goal setting, reflection, and peer collaboration, young students begin to mirror competencies emphasized in global frameworks such as the OECD's Learning Compass 2030.

Effective SDL integration involves strategies like formative assessment, project-based learning, and digital tools that support personalized learning. Teachers play a critical role as facilitators who scaffold and guide learning, rather than act as sole content deliverers. When implemented well, SDL fosters not only cognitive skills but also emotional and social development, supporting inclusive, differentiated, and student-centered education.

However, challenges include rigid curricula, limited teacher training, and standardized assessments focused on content recall. Addressing these barriers requires systemic reforms, including teacher professional development, competency-focused curricula, and new assessment models.

Ultimately, embedding SDL in primary education offers a strategic path toward preparing students to navigate the complexities of the 21st century with confidence, resilience, and independence.

Keywords: self-directed learning, 21st-century skills, primary education, learner autonomy, educational innovation

1. Introduction

In an era characterized by rapid technological advancement, global interconnectivity, and ever-changing societal demands, education systems are increasingly called upon to prepare learners not only with foundational knowledge but also with the skills necessary to navigate uncertainty and complexity. The 21st century has ushered in a paradigm shift in how knowledge is produced, accessed, and applied. Consequently, the role of education is no longer limited to knowledge transmission but must also emphasize the development of competencies that enable learners to think critically, collaborate effectively, communicate clearly, and innovate continuously.

International frameworks such as the Partnership for 21st Century Learning (P21) articulate these skills as essential for students to thrive in work, life, and citizenship. The P21 framework categorizes these competencies into three core domains: learning and innovation skills (the "4Cs": communication, collaboration, critical thinking, and creativity), information, media and technology skills, and life and career skills (P21, 2019). These competencies form the backbone of what is often referred to as "future-ready" or "lifelong learning" capabilities.

Considering this, there is a growing recognition that these competencies must be cultivated from the earliest stages of formal education, particularly within primary education, which lays the foundation for lifelong habits of mind. However, traditional models of education, particularly those centered around passive reception of knowledge, teacher-led instruction, and standardized testing, often fall short in fostering these future-oriented skills. This has prompted educators and researchers to explore more learner-centered approaches that actively engage students in the learning process.

One such approach to gaining attention is Self-Directed Learning (SDL). Rooted in adult learning theory (Knowles, 1975), SDL refers to the process by which individuals take initiative, with or without the help of others, in diagnosing their learning needs, formulating goals, identifying resources, choosing and implementing strategies, and evaluating learning outcomes. While originally conceptualized in the context of adult and lifelong learning, SDL has proven increasingly relevant for learners of all ages, including children in primary education. When developmentally appropriate scaffolding is provided, even young learners can exercise autonomy, reflect on their learning, and engage in goal-setting and self-monitoring (Garrison, 1997; Candy, 1991).

Moreover, SDL aligns closely with the goals of 21st-century education. Studies have shown that learners who engage in SDL are more likely to develop metacognitive skills, exhibit intrinsic motivation, and perform better in tasks requiring problem-solving and creative thinking (Song & Hill, 2007; Loyens et al., 2008). In addition, self-directed learners tend to take more responsibility for their learning and adapt more effectively to novel challenges that are indispensable in a rapidly evolving global landscape.

However, the integration of SDL into primary education is not without challenges. Young learners often require guidance, structure, and a supportive environment to develop the skills associated with self-direction. Teachers, in turn, must be equipped with the pedagogical knowledge and tools necessary to design learning environments that promote autonomy while providing appropriate support. This requires a fundamental shift in instructional practices, assessment models, and school culture.

This paper examines the role of self-directed learning as a foundational practice for developing 21st-century skills in primary education. Through a qualitative exploration of current teaching practices in Thai primary schools, the study investigates how SDL is implemented, how it supports the development of core competencies, and what factors facilitate or hinder its success. The goal is to contribute empirical insights and practical strategies to inform curriculum design, teacher development, and policy in support of transformative education for the 21st century.

2. Literature Review

2.1 Self-Directed Learning

Self-directed learning (SDL) is broadly defined as a process in which learners take the initiative, with or without the help of others, in diagnosing their learning needs, formulating goals, identifying resources for learning, choosing and implementing appropriate learning strategies, and evaluating learning outcomes (Knowles, 1975). The foundational idea behind SDL is rooted in adult learning theory, or andragogy, where autonomy, experience, readiness to learn, and intrinsic motivation play central roles in the learning process. However, in recent decades, the concept has been increasingly applied to younger learners, particularly in response to the growing emphasis on lifelong learning and the development of 21st-century skills.

In primary education, SDL does not imply complete independence from teachers or formal structures; rather, it involves a gradual release of responsibility, scaffolded by instructional strategies that empower students to take charge of their own learning (Garrison, 1997). This scaffolding is essential, as primary-aged children are still developing the metacognitive and self-regulatory capacities required for fully autonomous learning. Zimmerman and Schunk (2011) describe this development as a cyclical process involving self-observation, self-judgment, and self-reaction—skills that can be nurtured through explicit instruction and supportive environments.

Importantly, SDL in early education settings aligns well with constructivist learning theories, particularly those proposed by Vygotsky (1978) and Piaget (1970), which emphasize the active role of learners in constructing knowledge through interaction with their environment. In classrooms where SDL is encouraged, students are more likely to engage in exploratory learning, collaborative problem-solving, and reflective thinking—hallmarks of 21st-century competencies. Furthermore, SDL practices such as choice boards, learning stations, and inquiry-based projects create space for students to exercise autonomy while remaining within a structured framework (Blumberg, 2009; Canning, 2010).

Research has also highlighted the relationship between SDL and student motivation. According to Deci and Ryan's (1985) Self-Determination Theory, environments that support autonomy and competence contribute to intrinsic motivation, which is a key driver of engagement and deep learning. When primary students are provided opportunities to set their own goals and monitor their progress, they demonstrate increased ownership over their learning, improved academic performance, and greater resilience in the face of challenges (Kaplan et al., 2017).

However, implementing SDL in primary classrooms is not without its challenges. Teachers often face systemic constraints, such as tightly prescribed curricula, large class sizes, and limited professional development in student-centered pedagogies. Moreover, SDL requires a shift in teacher mindset—from a directive model to a facilitative role—which can be difficult to achieve without institutional support and ongoing training (Candy, 1991; Bolhuis, 2003). Nevertheless, when these challenges are addressed, the potential benefits of fostering SDL from an early age are substantial.

In summary, self-directed learning is a pedagogical approach that holds significant promise for primary education. By fostering learner autonomy, intrinsic motivation, and metacognitive awareness, SDL prepares students not only for academic success but also for the lifelong learning required in a rapidly changing world. As such, it is a foundational component of educational reform efforts aimed at equipping young learners with the skills and dispositions needed for the 21st century.

2.2 21st Century Skills in Primary Education

The discourse around 21st-century education underscores the necessity of preparing students for a world that is increasingly complex, fast-changing, and interconnected. The 21st-century skills framework, as proposed by Trilling and Fadel (2009), identifies a core set of competencies that extend beyond traditional academic knowledge. These include critical thinking and problem-solving, creativity and innovation, communication, and collaboration—often referred to as the "4Cs." In addition to these, other important skills such as information literacy, media literacy, and technology literacy are considered essential for learners to participate fully in the digital and globalized world.

In the context of primary education, embedding these skills is both a strategic imperative and a pedagogical challenge. At the foundational stage of learning, children are developing cognitive and socio-emotional capacities that are highly malleable. This early developmental window offers a prime opportunity for nurturing habits of mind that align with 21st-century competencies. For example, encouraging young learners to work in pairs or small groups fosters early collaboration, while presenting open-ended problems supports creative and critical thinking development (Anderson, 2010). However, effectively fostering these skills demands a shift in instructional design, away from rote memorization and passive learning, toward active, experiential, and inquiry-based approaches.

Learner-centered pedagogy plays a pivotal role in this transformation. Such pedagogies position students as active participants in the learning process, capable of making decisions, reflecting on their experiences, and engaging in meaningful dialogue with peers and teachers (Darling-Hammond et al., 2020). Project-based learning (PBL), problem-based learning, and design thinking are examples of instructional strategies that integrate 21st-century skill development into everyday classroom practice. These approaches not only align with constructivist theories of learning but also allow for the contextual application of skills in ways that are authentic and developmentally appropriate for primary students.

Furthermore, the role of teachers is evolving from that of knowledge transmitters to facilitators of learning. Teachers must be equipped to scaffold complex thinking, support collaborative activities, and integrate digital tools that enhance engagement and innovation. For instance, digital storytelling tools and educational apps can be leveraged to develop both literacy and digital fluency, while also promoting creativity and communication skills (Voogt & Roblin, 2012). However, without deliberate professional development and policy support, many educators may lack the resources or confidence to implement these approaches consistently.

From a curricular standpoint, integration of 21st-century skills should be cross-disciplinary rather than isolated in specific subjects. Literacy and numeracy remain crucial, but their delivery should be enriched with opportunities to apply skills in collaborative, real-world contexts. Curriculum design should promote metacognition, flexibility, and resilience—traits increasingly associated with lifelong learning and adaptability in uncertain environments (OECD, 2018).

In summary, the incorporation of 21st-century skills into primary education is not merely an add-on to existing curricula, but a call for systemic and pedagogical reorientation. Early and intentional emphasis on these competencies helps cultivate a generation of learners who are not only academically proficient but also capable of navigating the challenges and opportunities of the 21st century. As this paper argues, self-directed learning provides a vital pedagogical foundation upon which these skills can be developed and sustained throughout a learner's educational journey.

2.3 Self-Directed Learning and 21st Century Skills

Self-directed learning (SDL) is increasingly recognized as a foundational process for cultivating competencies commonly associated with 21st-century skills. These skills—often organized into the "4Cs": critical thinking, creativity, communication, and collaboration—are essential for learners to navigate complex social, technological, and economic landscapes (Trilling & Fadel, 2009; P21, 2019). The intrinsic characteristics of SDL, such as learner autonomy, goal setting, resourcefulness, and reflective evaluation, align closely with these competencies, particularly in fostering higher-order thinking and adaptability.

Research has shown that SDL correlates strongly with the development of metacognitive awareness and critical thinking. According to Song and Hill (2007), SDL enhances learners' ability to plan, monitor, and evaluate their own learning processes, thereby cultivating metacognitive strategies that underpin critical inquiry and problem-solving. When learners are encouraged to set their own learning objectives and determine the means to achieve them, they begin to develop cognitive flexibility—an essential trait for engaging with ill-structured or real-world problems (Candy, 1991).

In primary education, these benefits are particularly salient as learners are at a formative stage in the development of cognitive and social skills. Introducing SDL in early grades allows children to begin forming habits of independent thought, persistence, and collaborative engagement. For example, Hakkarainen (2003) found that when young learners engaged in project-based and inquiry-driven learning environments—both of which are forms of SDL—they demonstrated increased collaboration, shared knowledge construction, and emergent creativity. These activities required students not only to acquire content knowledge but also to negotiate roles, communicate ideas, and produce original solutions, thus engaging simultaneously with all four dimensions of the 21st-century skill set.

Furthermore, SDL in the primary context supports the development of communication and collaboration through its emphasis on peer interaction and co-construction of knowledge. Rather than passive reception of information, students involved in SDL often participate in dialogic learning—posing questions, debating ideas, and reflecting collectively on experiences. This form of interaction fosters interpersonal skills that are critical for working in diverse teams and adapting to dynamic environments (Scardamalia & Bereiter, 2006).

Creativity, another core 21st-century competency, is also enhanced when students are granted the freedom to pursue learning paths that reflect their interests and curiosity. SDL environments often support open-ended tasks and multidisciplinary exploration, which are conducive to divergent thinking and innovative problem-solving. A study by Zimmerman and Schunk (2011) on elementary learners noted that students engaged in self-initiated projects showed greater originality and persistence compared to those following teacher-directed instructions.

Moreover, the use of digital technologies in SDL has further expanded the possibilities for developing these skills. Online and blended environments, when designed to support autonomy and interaction, enable learners to access information, collaborate virtually, and present findings creatively (van Merriënboer & Kirschner, 2018). These affordances are particularly relevant for digital literacy—a critical component of 21st-century education.

Nevertheless, the effectiveness of SDL in fostering these skills depends on appropriate scaffolding. Primary students require structured guidance to gradually assume control over their learning. Vygotsky's (1978) concept of the Zone of Proximal Development (ZPD) suggests that learners can achieve higher levels of understanding when supported by more knowledgeable others—such as teachers or peers. Thus, SDL in primary education should not be equated with complete independence but rather with a guided transition toward autonomy.

In sum, SDL provides a natural and effective platform for embedding 21st-century skills into early education. It aligns with current pedagogical shifts toward learner-centered education

and supports the development of lifelong learning dispositions. The evidence suggests that when implemented thoughtfully, SDL can serve not merely as a teaching strategy, but as a transformative approach to preparing young learners for the challenges of the future.

3. Research Objectives

This study aimed to:

1. Examine how SDL is currently implemented in primary classrooms.
2. Explore the relationship between SDL practices and the development of 21st-century skills.
3. Propose strategies for enhancing SDL in primary education to support skill development.

4. Methodology

4.1 Research Design

This study employed a qualitative case study design, which is well-suited for exploring educational practices within authentic contexts (Yin, 2018). A case study allows for an in-depth examination of how self-directed learning (SDL) is understood and implemented in primary school settings and how it supports the development of 21st-century skills. The design supports a multi-source data collection strategy, ensuring a comprehensive understanding of classroom practices, institutional culture, and learner experiences (Merriam & Tisdell, 2016).

4.2 Participants and Setting

The research was conducted in a public primary school, BaanKlang School, a government-run institution located in a semi-rural area. BaanKlang School was chosen for its recognized participation in national innovation programs that promote active learning and autonomy at the primary level.

The overall sample consisted of:

- Nine primary school teachers from BaanKlang School who regularly incorporate SDL strategies into their lesson design.
- One student focus group from BaanKlang School consisted of six students (Grades 3–6) identified by their teachers as actively engaged in SDL-related classroom activities.
- Informal conversations were also conducted with school principals and curriculum coordinators to gain additional institutional perspectives on SDL implementation.

4.3 Data Collection

Data collection occurred over an eight-week period and utilized three primary qualitative methods:

- Classroom Observations (n = 12 sessions) : Four classroom sessions were observed at BaanKlang School. Observations focused on learning activities that promoted student autonomy, peer collaboration, and self-evaluation. A structured observation protocol was used to ensure consistency across sites. Detailed field notes and selective video recordings (with permission) captured student behavior and teacher facilitation practices.
- Semi-Structured Teacher Interviews (n = 9) : Interviews lasting 45–60 minutes were conducted with each of the nine participating teachers. Teachers from BaanKlang School provided valuable insights into how SDL is integrated within the constraints of the national curriculum, their strategies for promoting learner autonomy, and how they

assess students' SDL competencies. Interviews were conducted in Thai, recorded with consent, and later transcribed and translated for analysis.

- Student Focus Groups (n = 12) : Each focus group included 12 students at BaanKlang School, the group discussion explored how students experienced learning choice, managed their tasks, worked with peers, and reflected on their progress. The session was designed to be age-appropriate and interactive, using prompts and learning artifacts (e.g., student portfolios) to stimulate discussion.

4.4 Data Analysis

Data was analyzed using thematic analysis, following the six-phase process proposed by Braun and Clarke (2006). Transcripts from interviews and focus groups, along with field notes and observation summaries.

5. Findings

5.1 Evidence of SDL in Primary Classrooms

The findings from classroom observations, teacher interviews, and student focus groups revealed substantial evidence of self-directed learning (SDL) practices being implemented in various ways across the participating primary schools. Teachers reported that one of the most effective methods for fostering learner autonomy was project-based learning (PBL). In these settings, students were given thematic tasks or real-world problems and asked to work either individually or in groups to design a solution, create a product, or present findings. Projects often extended over multiple days or weeks, allowing learners to plan their workflow, identify learning resources, and make independent decisions—core tenets of SDL.

Choice boards were another widely used strategy. These are instructional tools that provide students with a menu of activity options, often aligned to specific learning objectives, from which they can select based on their interests or preferred modes of learning. Teachers noted that integrating choice boards into weekly lesson plans increased student motivation and ownership. Students, especially those in Grades 4–6, articulated that having options made learning "more fun" and "less stressful," indicating a growing sense of agency and intrinsic motivation—key indicators of self-directedness (Zimmerman & Schunk, 2011).

Learning journals served as reflective tools where students documented their learning goals, tracked progress, and evaluated outcomes. In some schools, these journals were part of a larger portfolio assessment system. Teachers used students' journal entries to provide personalized feedback, guide future learning steps, and initiate one-on-one conferencing. Several students described these journals as "a space to think about what we did and what we can do better next time," suggesting that metacognitive practices were actively encouraged.

Observation data further confirmed the presence of SDL behaviors in the classroom. In particular, students were often observed selecting their own learning materials from a curated selection of books, worksheets, and digital content. In science lessons, students used tablets to access online videos, simulations, and articles based on their research questions. In language arts, learners chose reading materials from thematic book bins aligned to curriculum units but diversified in terms of genre and difficulty.

Moreover, students were seen engaging in goal-setting activities, either as a class or individually. Teachers facilitated these sessions by helping students define achievable short-term learning targets, often displayed on classroom walls or included in personal planners. During focus groups, students referenced their goals frequently, with statements such as, "I want to finish two books this month" or "My goal is to ask more questions during science." These remarks reflect a shift from teacher-directed to learner-directed goal orientation, which is foundational for developing self-regulated and lifelong learners (Boekaerts & Corno, 2005).

Group activities also exhibited self-direction, particularly when students were given autonomy over task delegation, research methods, and presentation formats. In one observed instance, a group of Grade 5 students working on a community improvement project decided to conduct a classroom survey using Google Forms, analyze the results using basic graphs, and present their findings through a digital slideshow. The teacher's role was supportive rather than directive—providing scaffolding only when students requested assistance, in line with constructivist principles (Vygotsky, 1978).

It was also noted that classroom culture played a pivotal role in facilitating SDL. Classrooms where students were encouraged to ask questions, take risks, and reflect on errors were more likely to exhibit high levels of student agency. One teacher described her role as a "learning coach" rather than a knowledge transmitter, highlighting the importance of relational dynamics in nurturing SDL.

In summary, evidence from both teacher practices and student behaviors indicates that SDL is being actively promoted through various strategies in primary classrooms. The use of project-based learning, choice boards, reflective journals, and digital tools all contribute to creating a learning environment that empowers students to take charge of their education. While the degree of implementation varied across contexts, the overarching trend was a clear movement toward more autonomous, student-centered learning experiences aligned with 21st-century skill development.

5.2 Development of 21st Century Skills

The integration of self-directed learning (SDL) into classroom practice showed a significant influence on the development of core 21st-century skills, namely, critical thinking, creativity, communication, and collaboration. These skills, often described as the "4Cs" (P21, 2019), were observable in both student behavior and teacher-designed activities, demonstrating the potential of SDL to serve as a foundational pedagogical approach for holistic skill development in primary education.

Critical Thinking

Students were regularly engaged in problem-solving tasks that required independent reasoning, information synthesis, and reflective decision-making. In one observed science lesson, for instance, learners were given a real-world problem—how to purify dirty water using household items—and asked to devise and test multiple solutions. Rather than being directed step-by-step, students were encouraged to brainstorm possible approaches, evaluate the feasibility of their ideas, and adapt based on outcomes. This aligns with Facione's (2011) definition of critical thinking as a process involving interpretation, analysis, evaluation, and inference.

Moreover, teacher interviews revealed that open-ended questioning was used as a common strategy to provoke critical thought. Teachers often refrained from immediately providing answers, instead guiding students to justify their reasoning or consult peers. This approach promoted metacognitive awareness, as students were required to reflect not only on *what* they learned but also on *how* they learned it (Zimmerman, 2002).

Creativity

Creativity manifested most prominently through project-based learning and design-thinking tasks embedded in language arts and integrated studies. In one class, students were asked to write and perform a short play based on a Thai folktale. They collaborated on the script, designed costumes, and used multimedia tools for sound effects. Through this process, students generated original ideas, experimented with multiple representations, and engaged in iterative creation—behaviors that resonate with Torrance's (1974) conceptualization of creativity as involving fluency, flexibility, originality, and elaboration.

Additionally, students' visual presentations during inquiry projects showcased their ability to represent knowledge in diverse forms, including digital posters, infographics, and physical models. The freedom to choose formats appeared to empower students to explore personal interests, further nurturing intrinsic motivation and ownership of learning—key aspects of both creativity and SDL (Deci & Ryan, 1985).

Communication and Collaboration

The use of peer-based learning activities such as think-pair-share, small-group discussions, and team-based tasks facilitated the development of communication and collaboration skills. In observed classroom settings, students frequently engaged in dialogic exchanges where they had to express their opinions, listen actively to others, and negotiate shared understanding. This was particularly evident during group science experiments and interdisciplinary projects where roles were assigned to ensure equitable participation.

Teachers also reported that digital platforms such as Padlet and Google Docs were integrated to support collaborative writing and brainstorming. These tools not only allowed real-time co-construction of knowledge but also encouraged students to provide constructive peer feedback, reinforcing communicative competence and mutual respect.

Importantly, the development of these interpersonal skills was supported by classroom cultures that emphasized psychological safety, empathy, and mutual support. Teachers acted as facilitators, modeling effective communication strategies and providing scaffolds such as sentence starters and collaborative protocols. These findings echo Vygotskian principles, which suggest that cognitive and social development are deeply intertwined, particularly in mediated learning environments (Vygotsky, 1978).

Synthesis

The data clearly illustrates that when SDL is implemented with intentional design and teacher support, it provides a fertile ground for nurturing 21st-century skills. Students not only engage in tasks requiring higher-order thinking and creativity, but they also participate in rich social interactions that build communicative and collaborative competence. These skills, once developed, are transferable across contexts and lifelong learning settings, confirming the central thesis of this study: that SDL is a viable and vital foundation for cultivating future-ready learners from an early age.

5.3 Barriers and Enablers

The implementation of self-directed learning (SDL) in primary education settings is influenced by a range of institutional, pedagogical, and contextual factors. The analysis of teacher interviews, classroom observations, and student focus groups in this study revealed a set of barriers that inhibit the effective adoption of SDL, as well as several enablers that support its integration into everyday classroom practices.

Barriers

Curriculum rigidity emerged as a central obstacle in all three schools studied. Teachers consistently reported that the national curriculum and associated assessment requirements imposed strict timelines and content delivery expectations, leaving limited room for student-driven inquiry or exploration. For instance, one teacher noted, "Even when students want to explore a topic deeper, we often have to move on to the next unit because of time constraints." This highlights the tension between standardized curricula and the flexibility needed for SDL, a concern echoed in prior research (Coutinho, 2007; Jossberger et al., 2010).

Another significant barrier was the limited professional development opportunities related to SDL. Teachers expressed a lack of confidence in facilitating self-directed activities, particularly in differentiating instruction and providing scaffolding without dominating the learning process. Many were unfamiliar with strategies to balance guidance and autonomy, especially for younger learners who require more structured support. As one participant

explained, “We want to encourage independence, but we don’t know how to do that without losing control of the class.” This gap in pedagogical knowledge is consistent with literature indicating that SDL requires a shift in teacher roles—from content deliverers to facilitators of learning (Guglielmino, 2008; Loyens, Magda, & Rikers, 2008).

Moreover, classroom management concerns posed another barrier. Teachers worried that SDL activities, particularly those involving group work or open-ended tasks, might lead to off-task behavior or classroom disruption. This perception limited their willingness to experiment with more student-centered approaches. In under-resourced classrooms with high student-teacher ratios, these concerns were more pronounced.

Finally, socioeconomic disparities among students also affected SDL implementation. Some students lacked access to learning resources at home or the necessary support from parents to pursue self-initiated learning. These factors contributed to unequal readiness for SDL, highlighting the need for context-sensitive approaches (Merriam, Caffarella, & Baumgartner, 2007).

Enablers

Despite these challenges, the study also identified several factors that facilitated SDL in primary classrooms. One of the most prominent enablers was supportive school leadership. In the two schools where SDL was more successfully embedded, principals played an active role in promoting innovation and encouraging teachers to pilot new practices. These schools had a culture of experimentation and professional collaboration, where teachers felt empowered to try SDL strategies without fear of failure. As noted in Fullan's (2001) work on change leadership, such school environments are crucial for sustainable pedagogical transformation.

Another key enabler was the use of digital tools and learning platforms, which supported personalized learning and student autonomy. Tablets, educational apps, and online research tools allow students to engage with content at their own pace and according to their interests. For example, in one observed lesson, students used a learning management system to select mini projects aligned with their reading level and preferences. Technology also facilitated formative assessment and feedback, further promoting metacognition and self-regulation—core components of SDL (Zimmerman, 2002; Lai, 2011).

Additionally, student motivation and curiosity were natural drivers of SDL. In classrooms where students were given voice and choice, engagement levels increased, and students demonstrated a greater sense of ownership over their learning. Teachers noted that even younger students could take initiative when provided with appropriate structures and clear expectations.

Finally, collaborative teacher networks—both formal and informal—helped spread effective SDL practices. In one school, a teacher-led professional learning community (PLC) focused on student agency and regularly shared lesson plans, classroom strategies, and reflections on practice. These networks played an important role in building collective capacity and sustaining momentum for change.

6. Discussion

The findings align with a growing body of literature that positions self-directed learning (SDL) as a core enabler of 21st-century competencies (Cowan, 2006; van Merriënboer & Kirschner, 2018). By fostering autonomy, critical thinking, and collaborative engagement, SDL offers a pedagogical approach that not only supports academic achievement but also prepares learners to adapt and thrive in dynamic, knowledge-intensive environments. In the observed primary classrooms, students who were encouraged to set their own learning goals, choose resources, and reflect on their progress exhibited a range of skills consistent with the “4Cs” framework—critical thinking, creativity, collaboration, and communication (P21, 2019).

However, the study reveals that implementing SDL effectively in primary education requires a fundamental shift in both teacher mindset and pedagogical practice. Many traditional classrooms are built on teacher-centered models where knowledge transmission is prioritized over learner agency. Transitioning to SDL-oriented instruction challenges this paradigm, requiring educators to adopt the role of facilitators or learning coaches rather than information providers (Knowles, 1975; Guglielmino, 2008). Teachers must be equipped not only with strategies to scaffold autonomy but also with the confidence to allow students to make choices, explore independently, and sometimes fail as part of the learning process.

Furthermore, successful integration of SDL into primary education must account for developmental readiness. While some may question whether young learners can direct their own learning, research in constructivist and sociocultural theory suggests that with appropriate scaffolding, even early-grade students can develop self-regulation, goal-setting, and reflective skills (Zimmerman, 2002; Vygotsky, 1978). In this study, teachers used tools such as learning journals, project-based tasks, and digital platforms to support students' progression toward autonomy. These tools not only encourage metacognition but also enable differentiated learning pathways, fostering inclusivity and personal relevance.

A notable challenge identified in the study is the tension between SDL approaches and the constraints of standardized curricula and assessment regimes. Teachers often reported difficulty aligning open-ended, student-driven learning tasks with rigid content coverage expectations and summative testing schedules. This finding is echoed in international literature highlighting the misalignment between curriculum goals and assessment systems, which often fail to recognize or reward the development of soft skills and learner agency (OECD, 2018; Fullan & Langworthy, 2014). Consequently, systemic support is critical—school leaders, policymakers, and curriculum designers must collaborate to create conditions that enable the sustainable adoption of SDL practices.

The role of digital technology also emerged as a key enabler of SDL. In classrooms where students had access to learning management systems, online resources, and interactive platforms, they demonstrated greater engagement and ownership of learning. This aligns with literature suggesting that digital tools can enhance SDL by providing flexible, personalized, and multimodal learning environments (Lee et al., 2014; Lai, 2011). However, equitable access remains a concern, especially in under-resourced schools or regions with limited infrastructure.

In sum, the findings underscore that self-directed learning is not simply an instructional strategy but a foundational orientation toward lifelong learning. It demands systemic change, including teacher training, curriculum redesign, and supportive leadership—to flourish in primary education. When implemented thoughtfully, SDL not only prepares students with 21st-century skills but also cultivates lifelong learners who can adapt, innovate, and lead in an increasingly complex world.

7. Conclusion and Implications

This paper has argued that self-directed learning (SDL) serves as a critical pedagogical foundation for the cultivation of 21st-century skills in primary education. In examining classroom practices, student behaviors, and teacher perspectives, the findings affirm that SDL actively fosters the core competencies of communication, collaboration, critical thinking, and creativity—skills that are increasingly recognized as essential for learners navigating the challenges of a rapidly evolving world.

At the heart of SDL is the principle of learner agency—the idea that students, even at a young age, can make meaningful decisions about their learning. While traditional educational paradigms often emphasize compliance, coverage of content, and standardized testing, SDL challenges these norms by positioning students as active participants in their educational

journey. The classrooms observed in this study revealed promising shifts in this direction: students selecting their learning goals, managing resources, engaging in metacognitive reflection, and working collaboratively to solve authentic problems. These behaviors align closely with frameworks developed by the OECD (2018) and UNESCO (2020) advocating for student-centered, competency-based learning approaches.

However, the transition toward SDL is neither automatic nor universally accessible. The study revealed several systemic and pedagogical barriers that must be addressed. Chief among these are rigid curricular mandates, limited assessment flexibility, and a lack of teacher preparation specific to SDL methodologies. These challenges are consistent with broader critiques of education systems that struggle to balance prescriptive standards with the need for innovation and personalization (Fullan & Langworthy, 2014).

7.1 Pedagogical Implications

Teachers are the linchpins in the successful implementation of SDL in primary settings. Therefore, professional development must move beyond generic training sessions and provide sustained, practice-based learning opportunities for educators to design and facilitate SDL experiences. This includes instruction in scaffolding student goal setting, fostering reflective practices, managing student-driven projects, and using formative assessment tools that support autonomy rather than compliance. Teacher training programs should embed SDL not only as a concept but as a lived experience for pre-service teachers.

Furthermore, pedagogical models should integrate SDL with inquiry-based learning, project-based learning (PBL), and blended learning to create rich learning environments. These approaches share common features such as student choice, real-world relevance, and iterative learning processes. SDL can serve as the unifying pedagogical philosophy that links these practices under a coherent vision of 21st-century learning.

7.2 Curriculum and Assessment Implications

At the curricular level, schools need greater flexibility to implement SDL approaches meaningfully. Curriculum designers and policymakers should consider modular, interdisciplinary learning units that allow for open-ended inquiry and student voice. Curriculum frameworks should also emphasize learning processes, not just outcomes, recognizing that skills such as collaboration and problem-solving develop over time through experience and reflection.

Assessment systems, too, must evolve. The dominance of standardized testing and summative assessment regimes often discourages innovation in the classroom. Instead, educators and policymakers should promote formative, performance-based assessments, such as portfolios, learning journals, student-led conferences, and peer feedback. These tools not only align better with SDL principles but also provide richer insights into students' developing competencies.

7.3 Policy and System-Level Implications

The findings of this study hold significant implications for educational leadership and policy. For SDL to move from isolated pockets of practice to widespread adoption, system-level supports are essential. School leaders should champion SDL as a strategic priority, providing time, resources, and collaborative structures for teachers to design and share SDL practices. Ministries of Education and curriculum agencies should embed SDL in national education policies and frameworks as a guiding principle for 21st-century education.

Moreover, equity must be at the center of SDL policy efforts. Not all students have equal access to the resources or support systems needed to engage in self-directed learning. Schools must intentionally design for inclusion, providing differentiated support for learners with

diverse needs and backgrounds. Digital tools can be leveraged to support personalization, but they must be accompanied by thoughtful pedagogy and accessible infrastructure.

7.4 Final Reflections

In conclusion, this study reinforces the growing consensus that 21st-century skills cannot be "added on" to traditional education models; they require a fundamental rethinking of teaching and learning. Self-directed learning offers a compelling framework for this transformation, especially when introduced at the primary level. By fostering learner autonomy, critical inquiry, collaboration, and creativity from an early age, SDL prepares students not only for future academic success but also for active citizenship, lifelong learning, and meaningful participation in society.

If education systems are serious about preparing young learners for the complex demands of the 21st century, self-directed learning must become a central design principle—one that informs pedagogy, assessment, teacher development, and curriculum policy alike. Only then can we ensure that every child is empowered to thrive, not just in school, but in life.

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