

# From Boards to Future Skills: Systematic Literature Review 2019-2024 Integration of 21st Century Skills in the Elementary School Classroom

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## Keywords

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## Abstract

Globalization and rapid technological development require education to produce a skilled generation to face complex future challenges. The purpose of this study is to systematically review a number of previous literatures that discuss the integration of 21st century skills in learning in primary school classrooms. This research specifically describes how 21st century skills are integrated into the school classroom based on the findings in the published literature. In the preparation of this study, the Systematic Literature Review (SLR) method was used in analyzing and synthesizing relevant literature addressing the integration of 4C skills in primary school classrooms. Of the 34 articles reviewed, 7 articles met the inclusion criteria and were analyzed in depth. The integration of 21st century skills in primary schools is done through active, collaborative, contextual, and project-based learning that fosters learners' critical thinking, communication, collaboration, and creativity.

## 1. Introduction

The existence of globalization and technological development has changed the order of life in the 21st century. Globalization and technological advances provide new problems and challenges in every aspect of life. Indonesian people who are open to changes and technological advances must be able to produce generations that are able to adapt to changing times. Not only academic knowledge, individuals are required to have complex skills in order to face global challenges in the future. The development of 21st century skills known as 4C, namely critical thinking, communication, collaboration and creativity is the urgency of education in preparing young people who are skilled in 21st century society.

The rapid development of technology will have an impact on the world of education. Education essentially has the aim of changing the behavior of students both from knowledge, attitudes and skills (Sumarni et al., 2024). Education has the role of creating a generation that has strong competencies to face global challenges in the future. Schools must be able to adapt and facilitate their students to develop 21st century skills. As the initial foundation in education, elementary schools play an important role in instilling early 21st century skills.

Various studies that have been conducted have highlighted the importance of integrating 21st century skills, especially in elementary school education. Research conducted (Maulida, 2023) (Maulida, 2023) states that the thematic-integrative learning approach applied with appropriate and real contexts has a positive impact on improving the 21st century skills of students in elementary schools. This research also shows the importance of 21st century skills in facing various global challenges in the future. Widodo & Kusuma Wardani (2020) emphasized that careful strategizing and comprehensive integration are needed in learning 21st century skills in primary schools. Learning 21st century skills aims to train students in critical problem solving, public communication, teamwork, and innovation in creating new things. Meanwhile, Hamdani has identified 21st century skills learning through curriculum integration, cultivating learners' character based on the 4Cs, and digital learning services by the government and private sector.

21st century skills in the 2013 curriculum can be integrated using various approaches, one of which is a scientific approach combined with various learning models and methods (Daga, 2022). Based on a study (Dias Putra & Linuwih, 2020) (Dias Putra & Linuwih, 2020) Discovery learning proved effective in improving elementary students' creative and critical thinking skills, but had less impact on communication and collaboration than the expository method. Teachers need to adjust learning methods according to the 21st century skills they want to develop.

According to a study conducted by (Arifah & Diah Utami, 2023) (Arifah & Diah Utami, 2023) in the independent curriculum, 21st century skills are integrated through P5 (Projek Penguatan Profil Pelajar Pancasila). In the implementation of P5 there are various activities that demonstrate 21st century skills commonly referred to as 4C. According to (Alifah, 2022) Integration of 21st century skills in thematic learning is proven to increase the involvement and development of the potential of elementary school students. This strategy is in line with the Merdeka Curriculum and prepares students for future challenges, both academically and socially.

While there are various studies addressing the integration of 21st century skills in primary schools, there has not been much systematic research identifying the integration of 4C skills from the existing literature. By conducting a thorough review of the relevant literature, this study offers a new contribution to improving the understanding of the integration of 21st century skills in primary school classrooms.

This research focuses on examining how 21st century skills are integrated in primary school classrooms given that in the era of globalization education will continue to evolve and the importance of incorporating these skills in the learning process. The problems discussed in this study include how 21st century skills are integrated in elementary school classrooms.

The purpose of this study is to systematically review a number of previous literatures that address the integration of 21st century skills in learning in primary school classrooms. This research specifically describes how 21st century skills are integrated into the primary school classroom based on the findings in the published literature. Therefore, it is hoped that this research will provide a comprehensive understanding and serve as a foundation for the development of basic education practices in accordance with the demands of the times.

## 2. Method

In the preparation of this research, the Systematic Literature Review (SLR) method was used in analyzing and synthesizing relevant literature discussing the integration of 4C skills in elementary school classrooms. This method is used because it is able to provide a comprehensive and systematic understanding of education as well as current trends in integrating 4C skills in the era of globalization.

The source of this research comes from articles that discuss the integration of 21st century skills in elementary school classrooms. These articles were obtained from national and international journals that can be accessed in their entirety.

The literature was found through Publish or Perish software connected to databases such as Google Scholar and SINTA (Science and Technology Index Indonesia). The search used keywords such as: "21st century skills development in *primary school*", "*4C skills in primary education*", "*21st century skills integration in elementary school*".

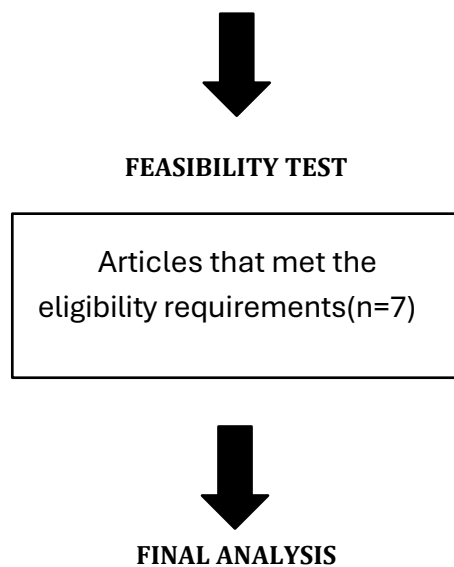
### IDENTIFICATION

Articles found through initial search through Publish or Perish software(n=34)



### SCREENING

Articles that met the inclusion criteria(n=17)



**Figure 1. PRISMA Guidance Chart**

The PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines were used in the article selection process, which included identification, screening, eligibility testing, and final selection for analysis. To be included in this study, the following criteria had to be met: (1) articles published during the last five years (2019-2024), (2) contained a discussion of 21st century skills (4Cs) at the primary school level, and (3) presented a specific overview of the integration of 21st century skills. Articles that were irrelevant, did not explicitly mention 21st century skills, or did not focus on elementary school were excluded from the analysis.

The data extraction sheet is used to extract data from selected articles. This sheet contains information on the author's name, year of publication, title, methods, objectives, main findings and conclusions present in the article. Next, the data was examined narratively and thematically to find common patterns, and differences with previous literature. To maintain the transparency and quality of the research, the results were presented systematically in accordance with PRISMA reporting standards.

### 3. Results and Discussion

#### 3.1. Results

21st century skills have become an important focus in the transformation of learning in primary schools, according to an analysis of 7 articles. Most studies agree that the 4C skills of critical thinking, communication, collaboration, and creativity are important skills that learners should have from childhood so that they are able to adapt to rapid global changes.

In the identification stage, the author uses the Publish or Perish application to find suitable articles. From the initial search results using relevant keywords, 34 articles were found. Next, the screening process was carried out based on the inclusion criteria of articles discussing 21st century skills (4C) at the primary school level was used as the basis for the screening process. The screening results showed that only 17 articles met the criteria. Of these 17 articles, further eligibility testing was conducted on articles that specifically addressed how 21st century skills are integrated in learning. The results showed that only seven articles met all the criteria and were subsequently analyzed in this study.

**Table 1. Article Selection Strategy**

No	Discussion Categories	Search Engines	Search Result
1	Year tracking in 2020-2025	Publish or Perish	34
2	Relevant title		17

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3	Presenting specifically	4C	integrations	7
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The articles selected were articles that met the criteria set by the author, namely, (1) articles published during the last five years (2019-2024), (2) containing discussions about 21st century skills (4C) at the primary school level, and (3) presenting a specific picture of the integration of 21st century skills. Relevant articles were analyzed and are presented in Table 2.

**Table 2. Integration in Primary School Classroom**

Article	Method	Integration in Primary School Classroom
<p>Mengajarkan Keterampilan Abad 21 4C(Communication, Collaboration, Critical Thinking, Problem Solving, Creativity and Innovation) di Sekolah Dasar (Widodo &amp; Kusuma Wardani, 2020)</p>	<p>Qualitati ve</p>	<p>According to the article, through active learning that is practice-based and student-centered, 21st-century skills (4C) can be taught to meet the demands of the times. The integration of 21st-century skills in elementary schools is carried out through real activities such as discussions, creative projects, case studies, and the use of technology with approaches that adapt to the needs of the students. In the learning process, the teacher acts as a facilitator in guiding students to explore ideas, engage in discussions, and find solutions to problems.</p>
<p><i>Does the Teaching Process in Primary Schools Correspond to the Characteristics of the 21st Century Learning?</i> (Sumardi et al., 2020)</p>	<p>Case Study</p>	<p>The article mentions that although teachers have a good understanding of the material, the majority of school learning is still teacher-centered, with minimal use of HOTS (Higher Order Thinking Skills) and ICT methods. The integration of 21st-century skills in elementary schools has not been maximized due to several factors, including the lack of teacher competence, traditional teaching methods, and the insufficient availability of digital resources.</p>
<p>Penerapan Keterampilan Abad 21 di Kelas V Sekolah Dasar (Sukmanasa et al., 2021)</p>	<p>Qualitati ve</p>	<p>The article shows that learning in elementary schools has integrated 21st-century skills through lesson planning based on TPACK, HOTS, and the PBL/PjBL model. Through project-based and problem-based learning, 21st-century skills are integrated as part of the development of students' abilities in critical thinking, creativity, collaboration, and communication in real activities.</p>
<p>Kompetensi 4C dalam Implementasi Kurikulum Merdeka di Kelas IV Sekolah</p>	<p>Qualitati</p>	<p>The article argues that the Merdeka curriculum provides teachers with the opportunity, through active, creative, and collaborative learning, to develop 21st-century skills (4C). Through project-based learning, discussions, presentations, and problem-solving activities that require critical thinking,</p>

Dasar (Nopiani et al., 2023)		communication, creativity, and collaboration skills comprehensively, 4C
skills in elementary school students can develop.		
Urgensi Pengembangan Keterampilan Belajar Abad 21 di Pendidikan Dasar (Hermansyah et al., 2021)	Qualitati ve	The article explains that the integration of 21st-century skills can be achieved by directing learning to be student-centered. Problem-Based Learning develops critical thinking skills; discussions and Q&A sessions enhance communication skills; cooperative learning fosters collaboration skills; and a creative learning environment encourages creativity and innovation. Additionally, the article emphasizes that as a moral foundation in learning, Islamic character values such as honesty, trustworthiness,
intelligence, and spirituality need to be integrated.		
Keterampilan Abad 21 dan Implementasin ya di Sekolah Dasar (Hamdani, n.d.)	Qualitati va	This article states that 21st-century education focuses on shaping individuals who are flexible, adaptive, critical, creative, communicative, collaborative, and digitally literate. 21st-century skills are integrated through the strengthening of competency-based curricula, namely K13 and the Merdeka Curriculum. The learning process is expected to train 4C skills
and support character education. This can be realized by the government through the provision of digital literacy platforms.		
4C Skills of the 21st Century: Their Nature and Importance in Primary School Learning (Barus, 2024)	Qualitati	This article emphasizes the importance of 4C skills in preparing students for the challenges of the future. The 4C skills are taught through student-centered learning, real-world contexts, collaborative projects, and technology. The teacher plays the role of a facilitator in guiding the development of students' critical thinking, creativity, communication, and
collaboration skills.		

Based on the review of the seven articles, it can be concluded that the rapid development of technology demands an increase in the quality of generations who are ready for future challenges. Referring to these demands, education is based on 21st century skills. 21st century skills consisting of critical thinking, communication, collaboration, creativity and innovation are the main focus in preparing a generation that is ready for future challenges. The seven articles agree that 21st century learning is centered on developing high-level critical thinking skills, active collaboration, effective communication and creativity and innovation. In accordance with the approaches and models presented, each article has a particular focus in highlighting each skill.

1. Critical Thinking: Most articles (7 out of 7) emphasized the importance of critical thinking in modern education. Sparking questions, problem-solving activities, case studies and analytical tasks improve students' reasoning skills.
2. Collaboration: Six articles emphasized the importance of working together in learning, whether in projects, group work or structured discussions. In their study of fifth grade students, Sukmanasa et al. (2021) even stated that collaboration was the element that received the highest score.
3. Communication: Five articles focus on improving communication skills both orally and in writing. Presentations, interviews, group discussions and reflection on learning are some of the ways in which communication is practiced. However, records show that students' confidence in conveying ideas still needs to be improved.

4. Creativity and Innovation: Five articles discuss creativity as part of project-based learning, STEAM, and imaginative tasks, such as creating poems and comics on cultural themes. Innovation and the use of various learning media are two other creative aspects.

This distribution shows that critical thinking is the most important skill taught in primary schools in the modern era. This shows how important it is for students to improve their ability to analyze and solve problems, which is an important foundation for facing future life challenges. Meanwhile, project-based and arts approaches enhance creativity, while collaboration and communication are considered important as social tools and self-expression.

The urgency of 21st century skills education is applied in elementary schools as an early introduction to the skills needed in the future. The integration of 21st century skills requires a change in the learning paradigm from teacher-centered to student centered, learners are required to be active in building their knowledge independently through various real problem-based activities, projects, group discussions and the use of digital technology. In addition to 4C skills, character values are also integrated in learning as a moral foundation for students. Learning is expected to not only produce a skilled generation but also have a character that is ready to face various challenges in the future. In its integration, 4C skills require support from a competent curriculum, digital literacy- based learning, and the provision of digital-based learning platforms.

In the learning process, the teacher acts as a facilitator who guides and directs students in finding their understanding. Teachers are also required to design active, creative and meaningful learning by considering the characteristics and needs of learners. Although various approaches are applied, the integration of 4C skills still faces several obstacles, especially related to the limited competence of teachers in using technology and the lack of digital infrastructure in elementary schools. Overall, although not optimal, the integration of 21st century skills in primary school classrooms has been attempted. Learners in primary schools are required not only to be proficient in cognitive aspects but also to have the necessary skills to face various challenges in the future.

Based on a systematic review of a number of literature discussing the integration of 21st century skills in elementary schools, it can be concluded that a learner-centered learning approach is the key to fostering 4C skills, namely critical thinking, creativity, communication, and collaboration. Various studies indicate that the use of project-based learning models, case studies, and the utilization of technology and student-centered methods have proven effective in developing these competencies. However, challenges remain, particularly regarding teachers' limited competencies, the dominance of traditional methods, and the scarcity of digital support tools. The Merdeka Curriculum and the TPACK approach are one solution that can bridge the integration of 4C skills more optimally in the classroom. Therefore, efforts to enhance teacher capacity, strengthen education policies, and provide 21st-century learning infrastructure must be a top priority to ensure the emergence of a generation that is adaptive and competent in facing future challenges.

## **3.2. Discussion**

The literature review analyzed shows that the application of 21st century skills in primary schools has changed from a normative discussion to a concrete and purposeful educational practice. In modern learning, the main focus is to ensure that learners have mastery of the material, exceptional thinking skills, and skills that are ready to face the challenges of the times. The 4C skills, which consist of critical thinking, communication, creativity and collaboration, are not only an indicator of proficiency in the modern era, but also a tool to support the achievement of the Pancasila Learner Profile.

The independent curriculum focuses on active and differentiated learning, project-based learning and the Pancasila learner profile strengthening program. The 4C integration can be seen through project-based learning. This learning requires learners to apply their abilities in communication between learners or teachers, collaboration in teams, problem solving and critical thinking skills and also creativity in completing tasks. This learning trains learners to face simple challenges as a snapshot of more complex future challenges.

### **3.2.1. Critical Thinking**

Almost all the articles analyzed emphasized the ability to think critically. This shows that previous research agrees that learners from the primary level must have the ability to sort out data, analyze arguments, and find solutions in the complex modern world. Widodo and Wardani (2020) stated that

simple case studies and contextual problem-solving activities can help improve critical thinking. In addition, the free curriculum allows activities like these to be carried out. They fit well with problem- and project-based learning approaches, where open discussions and sparking questions are an important part of the learning process.

Learning in primary schools requires gradual integration of the 4Cs, starting with teacher awareness, curriculum support, and readiness of the learning environment. Due to the importance of improving learners' ability to analyze data, understand causal relationships, and make thoughtful decisions, the articles analyzed show that critical thinking skills are the main focus. Learners can engage in problem-solving and reasoning processes due to learning models such as *discovery learning*, *problem-based learning*, and scientific.

### 3.2.2. Communication

On the other hand, communication is a skill learned through literacy and group interaction. The findings of Muttaqin (Fauzan Muttaqin & Rizkiyah, 2022) and Widodo reinforce the idea that one's verbal and nonverbal communication skills can be systematically shaped through daily literacy practices, such as reading, speaking and presenting work. Learning in primary schools is a strategic place to teach learners to listen actively, give ethical responses and express ideas well.

In the 21st century, communication skills are essential to foster courage, clarity and the ability to convey and receive information. Articles such as Sukmanasa et al. (2021) and Nopiani et al. (2023) emphasize how verbal reflection, directed discussions, and group presentations can improve these abilities. However, problems arise when learners, especially learners at the lower levels of primary school, continue to show shyness and hesitation when speaking in public. This is where it is important to build an emotionally safe learning environment and support digital literacy as an alternative way to communicate. Learners can be trained to convey their ideas through stories, artwork, or reflection videos that are more inclusive and suited to their individual learning styles by utilizing activities from the Pancasila Learner Profile Strengthening Project (P5).

### 3.2.3. Collaboration

Through active and project-based learning approaches, collaboration is a rapidly growing skill. Collaboration is a social learning process that teaches empathy, agreement and leadership, more than just group work. In grade V elementary school, Sukmanasa et al. (2021) found that collaboration was the skill that produced the highest score. This suggests that, with the right facilities, learners at that age have the ability to learn cooperatively. However, facilities such as the teacher's role as a social facilitator, flexible classrooms, and flexible time management strategies are needed to support this habituation. In addition, educational games, cross-subject thematic projects and teamwork-based P5 activities across grades or levels that foster a spirit of gotong royong can help foster cooperation.

The success of team-based projects and P5 activities appears to depend on collaboration skills. Group work teaches learners to balance roles, listen to others' opinions, and take responsibility for collective success. In Monica's article (Salma Monika et al., 2022), the importance of collaboration during the pandemic, where learning is not only done *online* but also through home visits, relies on collaboration between teachers, learners and parents. Teachers as facilitators in 21st century skills-based learning have a vital role. Teachers have a great responsibility in developing elementary students' 21st century skills. Their role is not only teaching, but also guiding and creating meaningful and adaptive learning to the challenges of the times. The integration of 4C skills in learning is the main key to the success of education in the era of globalization (Muthmainnah et al., 2023).

### 3.2.4. Creative

Although considered difficult to measure, creativity is actually a measure of the development of learners' creative thinking. Results from Maulida and Sukmanasa show that the thematic-integrative approach and PJBL help learners to be creative by writing poems, posters, comics, and solving environmental problems. The result of the work is not the only way to measure creativity but also the process of creative thinking and the courage to offer new ideas.

Someone who is creative in learning not only has the ability to make art, they also have the ability to think creatively, find new solutions, and dare to try new things. As shown by Widodo and Wardani (2020) and Nopiani et al. (2023), the tasks of making comics, poems, posters, and cultural projects are effective tools to enhance learners' creativity. Unfortunately, an overcrowded curriculum or teachers unfamiliar with STEAM approaches and differentiated learning designs often hinder creativity. Great

opportunities exist in wider creative spaces, such as the use of arts and technology in learning, in the independent curriculum. Creativity is now a learning process, not an end result. Learners should not worry about being wrong, but instead be encouraged to see the possibilities of their ideas.

However, difficulties to implement 21st century skills continue to occur. Teachers still face challenges in creating 4C-integrated learning tools, mainly because most have not received relevant training. In addition, there is a digital divide between schools that have adequate facilities and schools that do not have adequate facilities. This mismatch may lead to differences in the quality of education in Indonesia in the 21st century. Interestingly, before talking about technical implementation, some articles such as the one by Hamdani and Barus (Barus, 2024), emphasize how important it is to understand philosophically the meaning of skills in the 21st century. It is important for teachers to understand how project-based learning functions and the importance of improving learners' abilities for the future.

Overall, the primary education level has integrated modern skills into it, especially with the inclusion of Merdeka Curriculum, which allows teachers to innovate. Implementation requires collaboration between the curriculum, teachers' skills and learners' learning culture. Effective learning prioritizes academic outcomes and not just the ability to think, work and create. Therefore, the strategic steps taken to ensure that 21st century skills remain in primary schools are strengthening teacher professionalism, improving facilities, and fostering process-based evaluation.

The results show that improving the integration of modern skills in primary schools should start with improving teachers' ability to implement 4C-based learning. Teachers should also be supported with continuous and practical training involving the use of innovative strategies such as project-based learning and the use of digital technology. In addition, it is necessary to provide resources such as information technology and online learning platforms.

In addition to technical issues, the curriculum should be changed to allow for skills-based learning appropriate to the modern era, with an emphasis on process evaluation and character strengthening. Every learning activity should incorporate principles such as honesty, cooperation and responsibility. Schools, parents and communities should work together to enhance students' learning experiences. Primary school learning strategies are expected to produce graduates who are not only academically intelligent, but also innovative, communicative and strong in character who can handle challenges around the world.

### **3.3. Conclusion**

An analysis of 7 articles discussing how 21st century skills are incorporated into basic education found that the 4C skills of critical thinking, communication, collaboration and creativity are important skills that should be instilled since primary school. These four skills are interrelated and help learners build life skills to face the dynamics of the 21st century that demand digital literacy, flexibility, and the ability to think and act innovatively.

Various studies have shown that the discovery learning approach, project-based learning, scientific approach, and integration of themes across subjects (thematic-integrative) have all been proven effective in improving the 4C aspects in the classroom. The independent curriculum, especially through the Pancasila Learner Profile Strengthening Project (P5), allows teachers to create contextual and meaningful learning programs.

Teachers play an important role in developing and implementing learning that meets the needs of this century. However, issues such as lack of resources, insufficient training and inequality of facilities among schools still need to be addressed. Therefore, the government, schools and communities must work together to provide systemic support, continuous training and adequate infrastructure. 21st century skills-based learning in primary schools will not only improve the quality of education but will also shape independent, creative, adaptive and responsible learners as Pancasila learners and competent global citizens. This will happen if implemented correctly and sustainably.

Further research is needed to learn best practices for integrating modern skills in different primary schools with different social backgrounds and resources. To understand the impact of 4C-based learning on students' skills development in the long term, long-term evaluations also need to be conducted. Future research is also expected to investigate the most effective teacher training models to help teachers become facilitators of 21st century learning.

## Author Contributions

Salza Chusnul Khotimah: Conceptualization, Data curation, Formal analysis, Investigation, Writing – Original Draft Preparation, Writing – review & editing.

Candra Utama: Supervision, Validation.

All the authors have read and approved the final manuscript.

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