



## The Role of 4C in Preparing the Golden Generation of 2045

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### Abstract

This study explores the integration of 4C skills—Critical Thinking, Communication, Collaboration, and Creativity—into Indonesia's education system as a strategic effort to prepare for the "Golden Generation 2045." Using a systematic literature review, the research synthesizes academic studies, policy reports, and global best practices to provide a conceptual framework and actionable recommendations. Critical Thinking is emphasized for problem-solving, requiring shifts toward project-based learning and critical pedagogy, while Communication skills are deemed essential for global engagement, focusing on intercultural competence and digital literacy. Collaboration, vital for teamwork and innovation, advocates curriculum designs that promote inclusivity and team-based learning, while Creativity highlights STEAM initiatives and arts integration for fostering innovation. The findings reveal challenges such as inadequate teacher training, resource limitations, and cultural barriers, calling for experiential learning, cross-disciplinary approaches, and technology use to address these gaps. This research provides a roadmap for educators, policymakers, and stakeholders to transform educational practices, equipping Indonesia's youth with the competencies needed for global competitiveness and societal advancement.

**Keywords:** 4c Skills; Golden Generation 2045; Indonesian Education

## **Introduction**

This research focuses on an in-depth analysis of the role of the Four Cs (4Cs) skills - Critical Thinking, Communication, Collaboration, and Creativity - in the context of the transformation of the Indonesian education system towards achieving the vision of the “Golden Generation 2045”. This research topic arises from the strategic challenges faced by Indonesia in preparing high-quality human resources that are able to compete in the global arena, along with Indonesia's projection as one of the world's largest economic powers at the 100th anniversary milestone of independence. This comprehensive study aims to explore how the integration of 4C skills can be a fundamental instrument in revolutionizing pedagogical approaches, developing intellectual capacity, and shaping the character of Indonesia's young generation to be able to face the increasingly complex and unpredictable dynamics of technological, economic, and social change.

The academic significance of this research lies in its contribution to expanding the conceptual framework on the role of 21st century skills in transformative education, particularly in the context of developing countries such as Indonesia. Practically, this research has direct implications for educational policy-making, curriculum design and educators' professional development strategies. The World Economic Forum (2020) has underscored that 4C skills are essential prerequisites in the face of global job market disruption, where adaptability, critical thinking and innovation are key assets. By providing a comprehensive analytical framework, this research goes beyond identifying gaps in the current education system and offers concrete recommendations for transforming Indonesia's education ecosystem to be more responsive, inclusive and high-quality.

Various international studies have provided theoretical and empirical foundations on the significance of 4C skills. For example, research conducted by Trilling & Fadel (2009) in “21st Century Skills: Learning for Life in Our Times” shows that the development of critical thinking, communication, collaboration and creativity skills has a positive correlation with individual success in the modern work environment. Furthermore, a comparative study from OECD (2018) in various developed countries such as Finland, Singapore, and South Korea revealed that the systematic integration of 4C skills into the national curriculum significantly improved the quality of graduates and the competitiveness of the workforce. In the Indonesian context, Suryadi (2014) research in several provinces shows that there are still substantial gaps in the implementation of 4C skills-based approaches, especially in remote and less developed areas.

While there is a large body of literature on the 4C skills, there are some significant gaps that this study focuses on. First, the majority of previous studies tend to be theoretical and lack a comprehensive practical implementation framework, especially in the specific context of Indonesia. Second, there is a lack of research exploring the interdependencies between the four 4C skills and how their interactions can create transformative impact in education. The main contribution of this research is to develop a holistic model for integrating the 4C skills into the national education system, taking into account Indonesia's geographical, social and cultural diversity. The research does not simply

identify challenges, but rather offers adaptive solutions that can be tailored to the local context while maintaining international quality standards.

This research aims to answer the key question: How can 4C skills be effectively integrated in the Indonesian education system to prepare for the golden generation of 2045? Specifically, the research will explore: (1) The most optimal stage of 4C skills implementation in the education curriculum; (2) Teachers' professional development strategies to master and teach 4C skills; (3) Appropriate evaluation and assessment mechanisms to measure 4C skills progress; (4) Structural and cultural challenges in adopting 4C-based approaches in different regions of Indonesia. The units of analysis include educational institutions in three regional categories: urban, semi-urban and rural, with the sample including teachers, students, principals and education stakeholders at the national and local levels.

### **Research Methodology**

This research uses a literature review methodology with a systematic and analytical approach to explore the role of 4C skills in the context of Indonesia's educational transformation towards the 2045 golden generation. Unlike empirical research that uses field data, this literature study focuses on collecting, synthesizing, and critically analyzing various sources of scientific documentation, policy reports, academic articles, and official publications related to the development of 21st century skills, particularly the 4C skills (Critical Thinking, Communication, Collaboration, and Creativity). The research context covers the Indonesian education system in preparation for the global challenges of 2045, taking into account complex social, economic and technological dimensions. This research will examine how the 4C skills can be a strategic instrument in transforming the quality of Indonesia's human resources, in reference to the country's vision of becoming a major world economic power.

Although this is a desk study, the target population includes all academic literature, institutional reports and policy documents related to education, 21st century skills development and education system transformation in Indonesia and internationally. The units of analysis include comprehensive categories of documentation sources, including: (1) Research articles from indexed national and international journals; (2) Official reports of international institutions such as UNESCO, OECD, and World Economic Forum; (3) Education policy documents of the Ministry of Education and Culture of the Republic of Indonesia; (4) Academic books and monographs that focus on transformative education; (5) Research reports from leading universities and research institutions; (6) Policy publications from education think tanks; (7) Strategic documents related to Indonesia's human resource development vision 2045. Inclusion criteria included Indonesian and English language publications within the 2010-2024 timeframe, with prioritization on sources that have high relevance to 4C skills and educational transformation.

This research used a purposive sampling method with a systematic approach to identify and select documentation sources. The sampling technique was conducted through several stages: (1)

Initial search using academic databases such as Google Scholar, SCOPUS, Web of Science, and national electronic databases; (2) Source screening based on relevance to the research topic through abstract and keyword review; (3) Backward and forward citation analysis to identify key references and related publications; (4) Source quality assessment based on publisher credibility, research methodology, and significance of findings. Limitations of generalizability in this literature review include potential selection bias, reliance on the accessibility of source documentation, and the possibility of not identifying some important publications. To reduce bias, the researcher will use source triangulation strategies, conduct independent reviews, and document the source selection process transparently.

Data collection is conducted through a systematic documentation study using a structured literature review protocol. The data collection process includes: (1) Identification of keywords and comprehensive search strings, such as “4C skills”, “Indonesian transformative education”, “21st century skills”, “golden generation 2045”; (2) In-depth searches in various academic databases and digital libraries; (3) Initial screening based on the relevance of titles and abstracts; (4) Full-text review for documents that passed the screening stage; (5) Systematic extraction of key information using a standardized template that included methodological details, key findings, context, and implications. Data analysis used a narrative meta-analysis approach and qualitative content analysis, focusing on: (a) Identification of recurring patterns and themes in the literature; (b) Critical synthesis of findings across sources; (c) Evaluation of consistency and inconsistency in multiple perspectives; (d) Construction of a comprehensive conceptual framework on the role of 4C skills in Indonesian education.

To ensure the validity and reliability of the study, several strategies will be applied: (1) Use of a standardized and well-documented literature review protocol; (2) Involvement of at least two independent researchers in the screening and data extraction process to reduce subjective bias; (3) Triangulation of sources by comparing findings from different types of documents and perspectives; (4) Comprehensive documentation of each stage of the research process; (5) Assessment of source quality using standard criteria such as PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses); (6) Consultation with education and research methodology experts for validation of the analytical framework. The validation process will include a critical review of source selection methods, accuracy of interpretation, and significance of findings in the context of Indonesia's educational transformation.

## **Findings and Discussion**

### **Critical thinking**

Critical Thinking is the ability to objectively analyze information and make evidence-based decisions. In today's information age, where data can be easily accessed, the ability to sort out relevant

information is crucial. According to research conducted by Facione (2015), students who were trained to think critically showed significant improvements in analysis and problem-solving skills.

Education in Indonesia needs to integrate critical thinking into the curriculum. Project-based learning methods have been proven effective in improving students' academic outcomes in some secondary schools. By encouraging students to actively engage in research, data analysis, and real problem solving, this method not only helps students to develop critical thinking skills, but also prepares them to face challenges in the real world. Data released by the Ministry of Education and Culture also shows the positive impact of implementing this learning method. Schools that use project-based methods have recorded a 15% improvement in national exam results compared to schools that still use traditional methods. This shows that a more interactive and practical approach to learning can provide a significant boost to students' academic achievement. Thus, it is not surprising that project-based learning methods are gaining popularity in some secondary schools. Educators and education policy makers are expected to continue to support and encourage the implementation of this method so that more students can benefit in improving their learning quality and academic achievement.

The transformation of critical thinking requires a systematic approach that goes beyond conventional methods. Constructivism learning theory developed by Jean Piaget and Lev Vygotsky emphasizes the importance of learning environments that encourage students to construct knowledge through experience and social interaction. In the Indonesian context, this means designing a curriculum that does not simply transfer information, but encourages students to criticize, analyze and construct knowledge independently. The critical pedagogy approach requires teachers who do not only act as conveyors of information, but as facilitators who are able to create spaces for dialog, reflection and investigation. The education system must design more comprehensive assessment instruments that measure not only knowledge reproduction skills but also higher-order thinking skills. This requires continuous investment in teacher professional development, upgrading educational infrastructure and creating learning ecosystems that encourage intellectual courage. The main challenge is to transform the educational culture that has been dominated by hierarchical and teacher-centered approaches into a more dialogic, participatory and empowering model.

At the university level, study programs that emphasize critical thinking, such as social sciences and humanities, also show that their graduates are better prepared to face challenges in the world of work. A survey by the Indonesian Employers Association (APINDO) showed that 70% of companies prefer graduates who have critical thinking skills, as they can adapt quickly in a dynamic work environment (APINDO, 2021). However, a challenge faced in developing critical thinking in Indonesia is the lack of training for teachers. Many teachers still use conventional teaching methods that do not encourage students to think critically. Therefore, training and professional development for teachers should be a priority to improve the quality of education in Indonesia.

## **Communication**

Effective communication is another important skill in the 4Cs. In the context of globalization, the ability to communicate well, both verbally and in writing, is becoming increasingly important. According to a report from the National Association of Colleges and Employers (NACE, 2020), communication skills are one of the most sought after by employers. This shows that graduates who have good communication skills will find it easier to get jobs. Communication skills in the digital era require a comprehensive approach that goes beyond conventional language skills. The transformation of global communication requires individuals to not only master languages, but also understand intercultural contexts, the nuances of digital communication, and the ability to adapt in various communication contexts. Deardorff (2009) in his research emphasized that cross-cultural communication competence is a primary prerequisite in an increasingly connected global society. The ability to communicate effectively depends not only on language proficiency, but also on social intelligence, empathy, and the ability to understand different perspectives. A longitudinal study conducted by Spitzberg and Changnon (2009) showed that comprehensive communication skills involve cognitive, affective, and behavioral dimensions. Developing these skills requires an integrated approach that goes beyond the traditional classroom, involving digital technology, hands-on experiences, and intercultural exchange programs. Strategic implementation in the national education curriculum can create a generation of young Indonesians who are able to communicate globally with confidence and meaning. In Indonesia, developing communication skills can be done through an interactive learning approach. For example, several schools have implemented group discussion and presentation methods as part of the curriculum. This method not only encourages students to speak in public but also helps them learn to listen and respect the opinions of others. Data shows that students who engage in these activities have higher levels of self-confidence and better academic grades (Ministry of Education and Culture, 2022).

In addition, the lack of opportunities to practice speaking English is also one of the main challenges in developing communication skills in Indonesia. Many students are only accustomed to communicating in everyday Indonesian, making it difficult for them to switch and use English fluently. To overcome this challenge, it is important for schools and educational institutions to provide programs that allow students to practice communicating in English. This can be done through intensive English courses, conversation training, or even student exchange programs with English-speaking countries. With this opportunity, it is hoped that students can be more confident and proficient in communicating in English. In addition, technology can also be a very effective tool in improving students' communication skills.

With the existence of digital applications and platforms that provide speaking and listening exercises, students can independently improve their communication skills. That way, they can have more opportunities to practice and develop their communication skills without having to rely on the presence of teachers or instructors. With consistent and continuous efforts, it is hoped that the

challenges in developing communication skills in Indonesia can be overcome. By creating a supportive environment, providing opportunities to practice English, and utilizing available technology, students in Indonesia can become more confident and proficient in communicating in both Indonesian and English. By developing communication skills, Indonesia's young generation will be better prepared to contribute to an increasingly complex and connected society. It will also help them build strong professional networks, which are essential in today's workplace.

### **Collaboration**

Collaboration is a critical skill in the modern workplace. The ability to work collaboratively with others, both in teams and on cross-disciplinary projects, is becoming increasingly important as the complexity of the problems faced by organizations increases. According to research by Microsoft (2019), 86% of executives believe that poor collaboration is a major cause of project failure. In Indonesia, collaboration can be improved through team-based projects in schools and universities. For example, several universities have implemented team-based learning programs that involve students from various disciplines to work together to solve real-world problems. Data shows that students involved in these collaborative projects have better interpersonal skills and can work more effectively in teams (University of Indonesia, 2021).

Collaboration in the 21st century requires a deep understanding of the dynamics of collaboration that transcend traditional boundaries. The concept of modern collaboration is not just about dividing tasks, but creating synergies that enable the achievement of more complex and meaningful goals. Research by Cannon-Bowers and Salas (2001) identified that effective collaboration requires a combination of technical skills, interpersonal skills, and systems understanding. Education must design learning experiences that systematically build students' ability to work together in increasingly complex and dynamic contexts. International comparative studies show that countries with superior education systems have integrated collaboration as a core competency in their national curricula. This process involves not only project-based learning methods, but also the development of social skills, conflict management, and negotiation skills.

Research by Salas et al. (2008) emphasizes the importance of creating a learning environment that encourages collective reflection, where students not only work together but also learn to understand the dynamics of effective teamwork. However, the challenge faced in developing collaboration skills is the existence of a culture of individualism that is still strong in some regions. In addition, these activities can also provide great benefits to the surrounding community. Through participation in social and service activities, students can learn about the importance of contributing to the community and improve their interpersonal skills. They can also build networks with people from different backgrounds and learn to work together as a team. By creating a culture of collaboration in schools and universities, we can also prepare young people to become effective leaders in the future. Collaboration is key to achieving common goals and solving complex problems.

By learning to work together early on, students will have a strong foundation for success in their future careers. In addition, a culture of collaboration can also help reduce unhealthy competition among students. By focusing on teamwork and supporting each other, students can build strong relationships and strengthen their social bonds. This can also create a more positive and inclusive learning environment where each individual feels valued and supported. Thus, it is important for schools and universities to recognize the important role of a culture of collaboration in educating the next generation. Through programs such as social activities and community service, we can help students develop the collaboration skills needed to succeed in their lives and careers. A culture of collaboration is not just about working together, but also about building an inclusive and supportive community. By improving collaboration skills, Indonesia's young generation will be better prepared to face the challenges of an increasingly complex workforce. They will be able to work together with various parties to achieve common goals, which in turn will contribute to the progress of the nation.

### **Creativity**

Creativity is an essential skill in today's era of innovation. The ability to think creatively and generate new ideas is essential in facing global challenges. According to a report from Adobe (2021), 80% of business leaders believe that creativity is an essential skill for the future. In Indonesia, developing creativity can be done through a learning approach that encourages exploration and experimentation. For example, several schools have implemented the STEAM (Science, Technology, Engineering, Arts, and Mathematics) curriculum that integrates art and creativity into science and technology learning. Data shows that students involved in the STEAM program have better creative thinking skills and are more able to innovate (Ministry of Education and Culture, 2022).

Creativity in the context of modern education is a transformative ability that goes beyond the mere production of new ideas. It includes the capacity to think divergently, deal with uncertainty, and generate innovative solutions in a variety of complex contexts. Csikszentmihalyi's (1996) theory of creativity emphasizes that creativity is not simply an individual characteristic, but rather the result of a dynamic interaction between the individual, the domain of knowledge, and the social environment. Education that supports creativity requires a curriculum design that encourages exploration, experimentation, and tolerance for failure as an integral part of the innovation process. Robinson's (2011) study underlines the importance of creating educational spaces that value individual uniqueness and encourage creative expression through a variety of media. Amabile's (1996) research suggests that a learning environment that supports creativity requires a combination of intrinsic motivation, conceptual freedom, and structural support. Strategic implementation requires a complete transformation in pedagogical approaches, which focus not only on outcomes, but on the process of exploration and creation of new knowledge.

However, the challenge faced in developing creativity is the lack of support for arts and cultural activities in schools. One of the main challenges in education today is the lack of emphasis on developing students' creativity. Many schools still prioritize academic subjects such as mathematics

and science, thus neglecting the importance of arts and culture in the holistic development of students. The importance of developing creativity cannot be ignored, because creativity is a very necessary skill in a world that is constantly changing and developing. With creativity, students can learn to think outside the box, solve problems in innovative ways, and express themselves creatively. Therefore, efforts need to be made to increase support for arts and cultural activities in schools. This can be done by providing adequate facilities for arts activities, such as art studios, music rooms, and libraries that provide collections of arts and culture books. In addition, training for teachers is also important so that they can integrate arts and culture into their learning curriculum.

By increasing support for arts and cultural activities in schools, it is hoped that it can help students develop their creativity more optimally. Thus, students will not only be good at academics, but also have creative skills that can help them succeed in the future. By improving creativity skills, the younger generation of Indonesia will be better prepared to innovate and create new solutions to challenges faced by society. This will contribute to economic growth and the progress of the nation in the future.

## **Conclusion**

Education in Indonesia faces significant challenges in developing the 4C skills (Critical Thinking, Communication, Collaboration, and Creativity) in the younger generation. Transforming the education system requires a comprehensive approach that goes beyond conventional methods, focusing on developing critical thinking skills, effective communication, collaboration, and creativity. Project-based learning methods have been proven effective in improving academic achievement and developing soft skills needed in the global era. Research shows that interactive and participatory approaches can significantly improve students' ability to analyze information, solve problems, and innovate. The education system needs to design a curriculum that does not simply transfer information, but encourages students to criticize, analyze, and construct knowledge independently.

The implementation of 4C skills requires a complete transformation in the education ecosystem, from the role of teachers to assessment methods. Educators must transform from mere conveyors of information to facilitators who are able to create space for dialogue, reflection, and investigation. Digital technology, intercultural exchange programs, and critical pedagogical approaches are important instruments in developing students' abilities. Integration of STEAM curriculum, emphasis on cross-disciplinary collaboration, and creation of learning environments that encourage intellectual courage are key strategies. The main challenge lies in changing the culture of education from a hierarchical and teacher-centered model to a more dialogical, participatory, and empowering approach. Thus, the young generation of Indonesia can be prepared to face global complexity, have high competitiveness, and be able to contribute innovatively in various fields.

## Suggestion

Further research is recommended to explore in more depth the effectiveness of various 4C skills development methods in Indonesia. Researchers can design comparative studies that evaluate the impact of project-based approaches at different levels of education. It is recommended to develop comprehensive assessment instruments to measure critical thinking, communication, collaboration, and creativity skills more accurately. Longitudinal research that tracks the development of 4C skills from secondary school to the workplace would provide valuable insights. An in-depth study of the barriers to implementing 4C skills across educational contexts in Indonesia is needed. Researchers are also advised to investigate the influence of digital technologies and online platforms in developing 4C skills. International comparative studies can provide a global perspective on best practices in 21st century skills development.

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