# Critical Thinking, Collaboration, Creativity and Communication Skills among School Students: A Review Paper

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### Abstract:

Economies are increasingly more globalized and digitalized than ever before. This signaled and challenged the current education systems to alter and train future employees for a more dynamic, complex, and fast-paced 21st-century workforce. The main purpose of this review paper is to highlight existing studies on key soft skill competencies of 21st-century known as the "4 Cs" critical thinking, collaboration, creativity, and communication among school students and to explore various frameworks about 4 Cs in the current literature. This review paper also provides suggestions for future research in this area.

**Keywords:** *21st Century Skills, Critical Thinking, Collaboration, Creativity, Communication.*

## Introduction

The 21st century demands several skills beyond traditional academic knowledge to thrive in a rapidly evolving global society. The Four Cs skills, namely critical thinking, communication, collaboration, and creativity have emerged as essential competencies for students to succeed academically, professionally, and socially. Gerald (2015) states that the 4Cs are the central skills in the teaching and learning process of 21st-century education In the 21st century, people face serious problems and difficulties at societal, personal, and economic levels (Bialik & Fadel, 2015). Socially, we are stressed by apparent financial instability, climate change, individual, political, and religious intolerance, and racial crises. Economically, globalization and modernization are rapidly changing our mechanism of business. School and university graduates are searching to find desired employment opportunities that can fulfill their happiness (Arum & Roska, 2011). On the other

hand, employers and businesses are also looking for qualified and well-equipped employees with 21st-century skills. Therefore, the development of these skills is considered an indispensable tool for active and successful education (Halpern, 2014; OECD, 2018). Zehra and Kozikoğlu (2020) found that students' technological competencies are significant predictors of 21st-century learning skills. The study suggested training for teachers in educational technology which may contribute to the development of 21st-century skills among secondary school students.

According to Binkley et al. (2012), there are four categories into which 21st-century skills can be divided: ways of thinking (such as innovation, critical thinking, problem-solving, and learning to learn), ways of working (such as communication and collaboration), tools for working (such as information and ICT literacy), and ways of living in the world (such as citizenship, life and career, and sense of responsibility). In their evaluation of

frameworks for 21st-century skills, Chai et al. (2020) observed that the majority of the frameworks placed a premium on encouraging students to engage in critical thinking, creative thinking, and authentic problem-solving. Additionally, the researchers further focused on learning institutes to educate students in problem-solving, teamwork, and communication skills since this fosters creativity and progress in learning. The main purpose of this review paper is to explore studies on critical thinking, collaboration, creativity, and communication skills among school students, various frameworks about these skills, methods of intervention and enhancement, and future research recommendations within this area to uncover further potential avenues of investigation.

## Various Frameworks of 21st-Century Skills

Employers Call and Demand (Global Consensus)

To respond to the prevalent concern regarding the lack of necessary skills among new graduates, several surveys have been carried out (see Table 1) asking employers to articulate their views and demands from recent graduates (P21). For Instance, are they ready to work? by conference board and partnership for 21st-century skills, American Management Association (2010), East Asian Countries (2017), Assessment of Adult Competencies OECD (2013) Skills Outlook, National Standards for Arts Education (1994) and "Critical Skills Needs and Resources for Changing workforce". Table 1 exhibits global consensus with rare overlapping among skills from various organizations and shows consistent convergence of opinions, views, and recommendations.

## Partnership for 21st Century Framework for 21st Century Learning

Several industry leaders, multinationals, educationists, academicians, and several governments have worked jointly in different groups and formalize the 21st-century skills that learners should attain to survive and able to acquire employment in this competitive world of work. Partnership for 21st Century Skills (P21) is a public-private organization assigned to properly classify the essential skills for 21st Century students.

## Table 1. The 21st Century Skills Frameworks Provided by Various Organizations

| Partnership 21.org Skills Framework | American Management Association (AMA) 2010 | East Asian Education System (2017) | OECD Assessment of Adult Competencies (PIACC) 2013 | European Commission | Society for Human Resource Management "U.S.A." | National Standards of Arts (1994) America |
|---|---|---|---|---|---|---|
| Creativity and Innovation | Critical thinking | Development of Self | Information Processing and Interpersonal Skills | Critical thinking | Critical thinking | Critical thinking |
| Critical thinking and Problem Solving | Creativity | Interpersonal Relation | Problem-Solving | Problem-Solving | Adaptability | Problem-Solving |
| Communication | Collaboration | Thinking Skills | Literacy | Digital Competences | | Creativity |
| Collaboration | Communication | Good Citizen and Social Participation | Numeracy | | | Collaboration |
| Information, Media, and Technology Skills | | Contribution to the Global World | | | | Communication |
| Information Literacy | | Basic and New Knowledge | | | | Cross Cultural and Social Skills |
| Media Literacy | | | | | | |

A critical survey by the American Management Association (2010) found that 75% percent of business executives have voted to give priority to employees who possess 21st-century skills. Salcito (2012) also stated that traditional assessment approaches do not suitably evaluate the skills required to prepare students for working in this competitive world of work. Skills like critical thinking, collaboration, problem-solving communication, and creativity are all essential qualities for learners. Moreover, 21st century four Cs skills are not only a focal point for students but also indispensable for educators. They should put their efforts into utilizing best teaching practices while teaching and educating their students.

## Review of Related Literature

### Critical Thinking

The concept of Critical Thinking (CT hereafter) encompasses all types of knowledge and denotes genuine student involvement in the process of knowledge building through in-depth reflection and thought. For those who constantly seek answers to the questions they pose, curiosity and questioning are essential traits of persons who think critically. CT involves analyzing, evaluating, and synthesizing information to make informed decisions. The term first originated in literature in the middle of the 20th century (Rezaei, et al. 2011), followed by the idea of seeking proof for assertions or beliefs (Hughes, 2014). Research demonstrates that fostering CT leads to improved academic achievement, problem-solving abilities, and higher-order cognitive skills among students. CT is a "purposeful and self-regulatory judgment that results in interpretation, analysis, evaluation and inferences" (American Philosophical Association, 1990, P. 2). Organizations for Economic Cooperation and Development (OECD, 2008) indicated analytical skills are the core elements of education at all stages of development. Elder and Paul (2010) stated that when learners are thinking critically, they are linked and engaged intellectually. CT also refers to purposeful thinking in which an individual scientifically and habitually imposes norms and standards according to his or her thoughts (Paul, 1995).

Moreover, the importance of CT in education is evident. A person cannot learn appropriately without thinking well. It assists an individual in academic success. Conley (2008) found several habits of mind such as analysis, interpretation, accuracy and precision, problem-solving, and reasoning ability" may be more essential than content knowledge in academic achievements. CT skills guide learners to improve and develop other skills like analytical ability, higher level of concentration, and well-guided thought processes.

Abrami et al (2008) review presents vital findings about the effect of training in the improvement and enhancement of CT skills. They examined 117 research papers of which 27 were experimental in design. The study found two main themes: 1) Various assessment tools have been used so far which is initiated by (Willingham 2007; Abrami et al., 2008) and different research designs are applied in the previous studies, resultantly These made the evaluation of CT difficult and challenging to measure. The study further revealed Ennis's (1989) typology of four courses, the general, immersion, infusion, and mixed approaches for CT interventions. In the general course, both skills and dispositions are learning objectives without particular subject matter contents. On the other hand, contents are vital in both the immersion and infusion approaches. In a mixed approach, CT is considered an independent task within a specific subject matter. Moreover, results showed that when instructors received special advanced training in CT skills the impact of the intervention was greatest by contrast when the intention to improve students' CT skills only was poor. The study suggested that better and positive results can be achieved through purposeful, active, and teacher-supported training at both pre-service and in-service levels. (Yang et al., 2021; 2023; Paryanto et al.,2023). Though few other studies criticized

the efficiency of project-based learning (Loyens et al., 2023; Saqr & López-Pernas, 2023).

Likewise, Han and Brown (2013) conducted a mixed-method study to examine the impact of CT skills intervention on early childhood teacher candidates at Metropolitan University, United States. CT intervention and its assessment instruments were designed based on Paul and Elders' framework of CT followed by an interview. The total course duration was 16 weeks. In the first two weeks, teachers were pre-assessed in terms of their disposition toward the application of CT skills. Rests of the 14 weeks were intended to introduce, embed, and practice CT components within the course contents. After analysis, the study found that teacher disposition regarding CT skills was significantly enhanced and developed. Training in CT should be the primary task of education (Scriven, 1985).

Similarly, Belecina and Ocampo (2018) undertook an experimental design study to examine the impact of using problem-based situations in the enhancement of CT skills. In their study, four different problem situations were created to develop students' CT skills. The study found significant improvement in students' CT after practicing them. Cheta and Organ (2016) conducted descriptive research on science and mathematics secondary school teachers to observe the extent of integration of the 4 Cs skills in their daily lessons. After the analysis, it was found that integration of critical and creative thinking was low in their teaching of science and mathematics while communication and collaboration skills were significantly high. Embedding brainstorming strategies can significantly help learners to improve their CT skills. Such practice allows them to construct ideas and knowledge of their own by asking certain relevant questions in a particular subject. The study further concluded that mathematics and science teachers should desist factual learning but support and encourage deep learning for better academic outcomes. assumptions on CT and found the majority of teachers (89%) had a positive disposition toward CT.

## Communication

Effective communication skills encompass verbal, nonverbal, and digital literacy, enabling students to express ideas clearly, listen actively, and engage in meaningful dialogue. Proficient communication skills are crucial for academic success, collaboration, and career readiness. Literature suggests that integrating communication skills across the curriculum, utilizing technology, and incorporating project-based learning can enhance students' communication abilities. In today's digital era, communication skills have become essential and more varied (Gagliano, 2023). Communication is defined by (Partnership for 21st Century Skills) as the ability to meaningfully articulate thoughts and ideas effectively by using written, oral, and non-verbal communication cues. It is listening attentively to others to decode meaning, knowledge, speaker attitudes, and intentions in a variety of forms and contexts (Tortor, 2006). Besides, conveying thoughts, expressing opinions smartly, motivating and convincing others via powerful speech are the skills that have always been appreciated in the workplace.

An individual with effective communication skills has always been valued. In addition, there is an important link between communication and collaboration (Seefeldt, 2004). Brown and Duguid (2000) explained effective work comes up with teams as those "the talk and the work, the communication and the practices are always together and not separate". Therefore, communication skills are tangled with information, media, and technology skills. Likewise, Hobbs and Frost (2003) concluded that giving attention to media literacy in traditional literacy goals possesses the potential to; a) increase learning by design practices that are relevant to learners' home cultures, and b) scaffold diverse learning styles and meet the needs of various and multicultural learners. c) promote creativity, teamwork, self-expression, and workplace skills

Bambaeeroo and Shokrpour (2017) review presents significant findings about the effect of teachers' non-verbal communication during instruction. The study found (1 quality, amount,

and methods of using non-verbal communication are significantly correlated during the teaching process. (2 Adequate usage of verbal and non-verbal communication greatly influences the academic achievements of the students. (3) Results about non-verbal communication indicated that teamwork, supportive and balanced communication using speech, pictures, and body gestures have been effective and helpful for learners' academic success. The study suggested that teachers should be trained in communication skills mainly those who usually interact with a large number of students.

Chik (2016) examined the impact of peer learning methods on the enhancement of communication skills. Data is collected through survey and observation methods. After analysis, the study found that peer learning methods significantly enhanced students' communication skills. The study further recommended that teachers should encourage students to speak in the target (English Language) though they may encounter certain errors during communication. The peer learning method also develops tolerance, teamwork, and mutual respect among the students.

Similarly, Sugito et al (2017) undertook a study on 34 junior school science students to investigate the impact of problem-posing and presentation methods on students' communication skills. The study was conducted in two phases using observation, interview, and questionnaire for data collection with pre-test and post-test assessments to measure the achievements in communication skills. The study found that problem-posing and presentation methods teaching science subjects profoundly enhanced students' communication skills. The study also reported teaching this way also enhances learners' confidence.

## Collaboration

Collaboration emphasizes the ability to work effectively as part of a team, valuing diverse perspectives, and contributing to collective goals. Collaborative skills are vital to foster empathy, cooperation, and a positive learning environment. Cooperative learning structures, group projects, and peer-assisted learning strategies have been found to enhance collaboration among students. Pantiz (1996) asserts that collaborative learning is a personal philosophy. McGuire (2018) pointed out that collaboration refers to the capability of learners to work together and collaborate. Students who collaborate share ideas, work to resolve problems, and accomplish shared goals. (O'Grady-Jones and Grant, 2023). Results of a large meta-analysis of 164 studies revealed that various pedagogical methods of cooperative learning were shown to be effective in enhancing learners' academic achievements (Johnson et al., 2000).

The educational strategy known as collaborative learning seeks to increase students' learning through project activities in groups (Vogel, 2018). This enables learners to develop their meaning from a variety of sources rather than just memorizing facts and figures. In addition, collaboration is defined as the capability to work efficiently, effectively, and courteously with diverse teams to make desired compromises for the attainment of common goals. Through collaboration, students acquire fundamental skills of productive communication and respect for others (Bell, 2010).

Furthermore, a rapid technological movement and the invention of smart gadgets made it easy for educators and students to collaborate face-to-face with their classmates and people around the globe. They can get in touch through various social media apps and can discuss things required for their educational achievements. Collaborative learning involves the working of two or more people who share responsibilities, make collective decisions, and act together to learn something. For collaborative work, self-management, time, and effort are the requirements that students need to understand (Hernandez, 2012). Students collaborate in small groups to accomplish a variety of class projects and tasks to better understand challenging ideas and concepts (Roldán Roa et al. 2020).

Lizzo and Wilson (2006) indicated that factors such as team-building activities, frequency of meetings, and goal orientation significantly

contribute to collaborative learning and improve communication skills (Kleinert et al., 2015). Collaborative learning also scaffolds and develops self-confidence among learners (Knight and York, 2003). Janssen and Wubbels (2017) interviewed 19 teachers and 23 students from various disciplines in Vietnam to explore challenges to the efficacy of collaborative learning from the teacher and learners' points of view. After the interview, the study found less collaboration skills among students and teachers and their relationships. The study further suggested that special attention is required by teachers to balance the cognitive and collaborative features of the respective learning. The infusion of these aspects ensures social interaction is essential to the efficacy of collaborative learning.

## Creativity

Creativity involves generating new and innovative ideas, thinking outside the box, and finding unique solutions to problems. It encompasses skills such as imagination, flexibility, originality, and the ability to approach challenges with a fresh perspective. The partnership for 21st-century skills (P21) focuses on the importance of creativity among students. Several fattest growing jobs and emerging industries rely on and give preferences to creative capacity among employees (Henderson, 2008). Similarly, Daniel Pink asserts," The future belongs to very different kinds of person with very different kinds of mind-creators and empathizers, pattern recognizers and meaning makers. These people will now reap society's richest rewards and share its greatest joys". Maslow (1962) indicated that creativity is essential for self-actualization. It is the ability to find hidden patterns and make associations between seemingly unrelated phenomena to find solutions to existing problems. Williams and Ogan (2016) focused on school teachers to integrate critical and creative thinking skills in their lessons to make their lessons more meaningful.

In addition, creativity is the root of progression and advancements without this there would be no cars, no books, no medical facilities, and no space missions (Toffler, 2017). The article further explains that creativity refers to and calls for curiosity, innovation, abstract thought, and empathy which need teamwork and perseverance. Kenneth Robinson, an international advisor on education has rightly said, "Creativity is as important as literacy and we should treat it with the same status" (Robinson, 2013). Sternberg (1999) states that creativity is available among everyone, but is most prevalent in young children. Commerce and leaders of society are looking for innovative ways of doing their business which requires creative employees (Robert et al., 2018).

Creativity is an essential element of learning and can be promoted in class with openness to experience. The school environment plays a vital role in the improvement and development of creativity (Alfuhaigi, 2014). Creativity is a positive attribute of every student and should be a part of the current school and university classes during learning. Creativity can be defined as using a wide range of idea creation techniques like brainstorming and then elaborating, analyzing, and judging the original ideas to improve and make the best use of creative effort. Al-khatib (2012) found a positive impact of using a brainstorming strategy in developing the creative thinking skills of the students. Creativity can be developed and enhanced by giving interventions as well as by applying certain teaching and learning methods. Chang (2012) asserted that the Creative Problem Solving (CPS) technique is often used to scaffold the respective skill during the teaching and learning process. CPS technique is the process and practice of identifying challenges, creating ideas, and then applying unique solutions to attain a new product (Mrymel, 2003).

Aichouni et al (2015) carried out a study on 66 both school and university-level gifted learners in Saudi Arabia. The purpose of the study was to explore factors contributing to the enhancement and development of creativity and innovation. An online survey was conducted to explore (1) Individual characteristics (2) their curriculum and school environment (3) support and management (4) Pedagogical practices and opportunities. After the analysis, the study

revealed that students' perception toward enhancement of creativity and innovation was pedagogical opportunities and the improvement of the environment in the Saudi educational system. The study further added that there is a lack of effective training and awareness programs regarding creativity and innovation at both basic and higher levels.

## Conclusion

This review paper highlighted recent studies on critical thinking, collaboration, creativity, and communication skills with various frameworks, approaches to intervention, and future research suggestions in this area. All the reviewed studies recommended these skills for school education to educate students for 21st-century workforce. Society is changing rapidly and this rapid change requires a shift from memorization to practice (Wanger, 2008). Other Scholars also emphasized that significant reformation is essential in the existing curriculum and teaching practices to educate students for the 21st-century workforce (Friedman, 2007; PISA, 2006; Bialik & Fadel, 2015). Based on the literature review, the following suggestions for educational implications and future research recommendations are provided in this area.

## Recommendations

### Critical Thinking Skill

Proper intervention should be given to students for the development of CT skills as intervention significantly contributes to the enhancement of the respective skills. Scriven (1985, p, 11) asserts that "training in CT should be the primary task of education". In addition, Pedagogy also matters and profoundly enhances students' CT skills such as mixed teaching approaches where the contents and CT are combined (Abrami et al, 2008). The general approach and infusion approach of teaching also positively influence and enhance students' CT skills (Abrami et al, 2008; Zhang & Yuan, 2022). Brainstorming strategies (asking questions and making students think) and integrating information

communication technology in the classroom ICT contribute to the improvement of CT (Cheta and Organ, 2016). Furthermore, effective training for teachers in this regard may scaffold and enhance students' CT.

### Communication Skills

Communication is the ability to meaningfully articulate thoughts and ideas effectively by using written, oral, and non-verbal communication cues and the ability to listen attentively to others to decipher meaning, knowledge, speaker attitudes, and intentions in a variety of forms and contexts (Partnership for 21st Century skills, P21). Successful communication intervention produces desired communication attainments Kearns et al, (2015). The peer learning approach plays a significant role in the improvement of communication skills (Chik, 2016), problem-posing and presentation methods advance students' communication skills (Sugito et al., 2017). Similarly, Yahya and Ramli (2009) found self-concept is significantly associated with interpersonal communication. Therefore, educators are encouraged to keep student self-concept as a key component while teaching. One way to scaffold the respective factor is to keep sound positive academic relations with their students. Due to this relationship, students are reinforced and keen to communicate and share ideas which may ultimately improve their communication skills. Communication should be added as a subject in the school curriculum (Yahya and Ramli, 2009).

### Collaboration Skill

In collaborative learning, tasks should be structured and clear direction should be provided to students which ultimately results in an agreed decision. Clear direction and pre-planned activities allow students to equally participate in the group. Teamwork and goal-oriented tasks significantly promote collaboration among students. For successful collaboration, teachers and students should understand collaboration skills (what collaboration looks like) particularly, the teacher role and student role in collaboration are essential. Providing adequate time to learners enhances the cognitive process (Education

Research Center at Texas A&M University 2013). Students should be trained in collaboration skills to deepen their understanding and methods of exercising (Janssen and Wubbels, 2017). They also specified certain obstacles to effective collaborative learning namely lack of collaboration skills among learners, competence status, free riding, and friendship among them. Thus, teachers need to pay special attention to the respective challenges and find proper approaches to resolve them (ÇUBUKCU and DÜNDAR, 2008).

### Creativity Skills

Creativity is the foundation of development and advancements as without these, there would be no cars, no books, no medical facilities, and no space missions (Toffler, 2017). The school environment plays a significant role in the development of creativity skills (Alfuhaigi, 2014). School administrators should adopt social and psychological freedom, a punishment-free environment, a sense of security, a positive relationship between teachers and students, and sufficient attention to co-curricular activities which ultimately direct students to use their abilities and innovate unique ideas. Teachers should allow students to express their ideas, experiences, and their imagination (Angeloska, 1996, p. 4-5). Aichouni et al (2015) also recommended environmental factors for the improvement of students' creativity skills. Moreover, brainstorming strategies significantly contribute to the enhancement of creativity (A-khatib, 2012), and effective interventions promote creativity skills among students. Chang (2012) also suggested that, techniques like, Creative Problem Solving (CPS) assist the teacher in promoting creativity among students while teaching. Visual images (clues) profoundly scaffold learners' creativity, particularly design arts education students.

All in all, students not only need disciplinary knowledge but are also required to develop 21st-century skills via their daily learning to meet the requirements of the 21st-century world of work. Educational authorities should first look at the existing curriculum in their schools. Then they should inculcate a type of curriculum that insists on and supports both disciplinary knowledge and 21st-century skills. Hence, the government should first make a policy that announces emphasis on the integration of 21st-century skills in the school curriculum on the regional/national level. Then the government should offer policy incentives to directorates/departments of education at the state/provincial level to prioritize the integration of these skills mainly critical thinking, collaboration, creativity, communication, and technology skills with complete direction of implementation in each classroom.

## Future Research Suggestions

First, Salcito (2012) noted that traditional assessment approaches do not accurately measure and evaluate 21st-century skills among learners. Vista et al. (2018) also added that using 21st-century assessment data requires solid research and new approaches in terms of both aspects of measurement and the collection of data. The assessment of these skills is a challenging process (Karchmer-Klein et al., 2012; Forum, 2015; Grainger et al., 2019). Thus, future research is needed to develop proper data collection and assessment tools that can accurately measure these skills for a better understanding of the scenario. This will allow the researchers and educators to design accurate teaching/learning practices and strategies for better learning outcomes Geisinger,2016; Tan et al., 2017). Second, based on the literature, there is a lack of empirical studies and evidence in this area except critical thinking skills. The three other skills namely collaboration, communication, and creativity are empirically remained unexplored. Ahomen and Kinnunen (2015) indicated collaboration is rated as the most essential competence in the future. Hence, exploring this research gap could be an interesting study in the future.

Third, educational technology significantly fosters critical thinking, collaboration, and innovation among school students (Theimen, 2008; Önür and Kozikoğlu, 2020). Future studies can be conducted to examine secondary

and senior secondary school pre-service and in-service teachers' technology integration in their instructional plans and then explore the role of this integration in the development of critical thinking, collaboration, and innovation skills. Finally, a qualitative study can provide the big picture of the current curriculum concerning 21st-century skills in schools. This may provide the researcher with a clear map of the present policies related to curriculum and teaching development. This means that policy related to curriculum and its goals should be reexamined to what extent the current curriculum can fill the gap between school and society.

There is a need for rapid development of 21st-century skills in the context of East Asian countries (Cheng, 2017; Rolleston, 2018). Employers are progressively looking for workers with non-routine cognitive abilities and interpersonal skills. Literature about 21st-century skills is less evident in developing contexts (Kattan, 2017) specifically in the development of a single model of definition for 21st-century framework. Hence there is a need to first adopt/develop a model that encompasses particular professional skills and personal qualities that can significantly assist students for future academic and professional success.

Last but the least, based on the related literature review, there is a lack of consensus over the approaches to teaching and assessment of 21st-century skills in general. From a pedagogical point of view, Kim et al. (2019) and Care et al. (2019) also put special emphasis on future research in this area to understand the academic achievements or "Learning Progression" of learners among these skills. Such studies can be conducted after the considerable reformation in curriculum, teaching methodologies, and the reformation of assessment tools for 21st-century skills.

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