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Research Paper

Strengthening Foundational Skills Through the 4Cs: A Path to Future Ready Classrooms

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ABSTRACT

The creation of human capital is based on fundamental education (foundational literacy and numeracy). Since this issue is crucial to determining a nation's growth and development, it must be addressed immediately to cope with 21st-century society. This review-based thematic analysis explores the major components of foundational literacy and numeracy and the challenges to achieving them. This paper also explores the importance of integrating 4Cs into early education and the strategies to incorporate 4Cs and foundational skills in early education classrooms. This study underscores the support to offer insights for primary stakeholders and especially to grab teacher attention for creating innovations in daily pedagogical practices in classrooms.

Keywords: *FLN, 4Cs, Critical Thinking, Phonological Awareness, Creativity, Project-based learning*

Foundational Literacy and numeracy skills are especially crucial in the modern educational system (NEP, 2020), where technology and worldwide connectivity are pervasive. Lack of 21st-century skills may make it difficult for students to pursue higher education, effectively participate in the workforce, or contribute to society in meaningful ways. FLN contributes significantly to the fight against educational inequality by making sure that all students, regardless of background, have the resources they need to prosper (Humaidi et al., 2024; Kilag, et al., 2024; Khodamoradi, 2024). We can say that Foundational Literacy and Numeracy is more than just a place to start; it is the gateway to 21st-century active citizenship, personal empowerment, and lifetime learning. Furthermore, the foundation for success in all other areas of education is literacy and numeracy. Understanding physics, history, and social sciences requires reading comprehension, and finishing assignments and putting concepts into essays or reports require good writing abilities. Similar to this, numeracy abilities are essential for science, maths, and even geography (having a comprehension of facts and graphs). A lack of a strong foundation in these areas makes academic success hard (Fauiz, M. et al., 2024; Kilag, et al., 2024; Kumar et al., 2022; Nuryati et al., 2024).

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Other than that, technology, globalization, and rapid change have a greater impact on society and the workplace in the twenty-first century. People must develop a set of abilities beyond conventional knowledge in order to succeed in the present context. To flourish personally and make a significant contribution to the workforce and society, one must possess 21st-century skills (UNESCO et al., 2017; OECD, 2018;). Therefore, it is crucial to prepare children for success in the quickly evolving world of today by integrating 21st-century skills with fundamental literacy and numeracy skills in the classroom. While the cornerstone of education consists of fundamental skills like reading, writing, and basic mathematics, it is also crucial to give students the technical, communication, problem-solving, and critical thinking abilities they need to navigate the complexity of today's world (United Nations, 2015; Demirkol Orak & Inozu, 2021; Khodamoradi, 2024).

The harmonisation of 21st-century skills and FLN skills creates a holistic teaching-learning environment where students acquire the flexibility, creativity, and teamwork necessary to succeed in the technologically advanced world, in addition to acquiring fundamental educational competencies. By combining these fundamental skills with the needs of the future world, teachers may produce well-rounded students who are ready for both the opportunities and problems of the present as well as future (NCFSE, 2023; Kumar et al., 2022; Demirkol Orak & Inozu, 2021).

Understanding Foundational literacy and numeracy:

Foundational literacy

Foundational Literacy involves the ability to read, write, and decode the written language. It encompasses skills like decoding words, comprehension, and using language creatively and effectively to communicate ideas.

The major aspects of foundational literacy are:

Oral Language Development	Oral language experiences are essential to enhancing writing and reading ability.
Phonological Awareness	The skills that individuals possess in this domain are word awareness, rhyme awareness, and word-sound awareness, which should result from their worthwhile interaction with language.
Decoding	These skills include awareness of the print, Akhara knowledge and decoding, and word recognition.
Vocabulary	It encompasses the abilities of oral vocabulary, reading and writing vocabulary, as well as morphological analysis of words.
Reading Comprehension	It encompasses the ability to comprehend texts, obtain information from them, and analyze texts.
Reading Fluency	Reading fluency encompasses the capacity to read the text accurately, speedily, expressively, and with comprehension, enabling students to draw inferences from the text.
Concept about Print	To develop comprehension skills, the students need to be exposed to a variety of print-rich environments.
Writing	It includes the ability to write akharas, words, and writing for expression.
Culture of Reading/Inclination towards Reading	It includes motivating students to read an assortment of books and other reading resources.

(Source: NIPUN Bharat)

Foundational Numeracy

Foundational numeracy is the competency to solve problems in daily life by using basic numeric principles and reasoning. The basis for studying mathematics in early primary classrooms is laid by the preschoolers' acquisition of pre-number and number concepts, data, and the abilities to compare, seriate, classify, and recognize patterns.

The major aspects of foundational numeracy are:

Pre-Number Concepts	The capacity to count as well as understand the numeration system belongs under this domain.
Numbers and operations on numbers	It refers to the learning norms required to become proficient in computational techniques, such as representing numbers using the base ten system.
Measurement	To do addition, subtraction, multiplication, and division on integers with a maximum of three digits, one must be able to comprehend and use basic algorithms.
Shapes and Spatial Understanding	It refers to carrying out basic math operations in a child-friendly manner up to three-digit numbers and applying them to various daily activities.
Patterns	It includes expanding student's knowledge of space and spatial objects by teaching them relational terms.

(Source: NIPUN Bharat)

Fundamental literacy and numeracy skills are essential for future academic and professional success, not just in childhood. Nearly all professions demand strong reading and writing skills, and numeracy is crucial in sectors ranging from banking to engineering. These fundamental abilities are crucial for lifelong learning and adaptation.

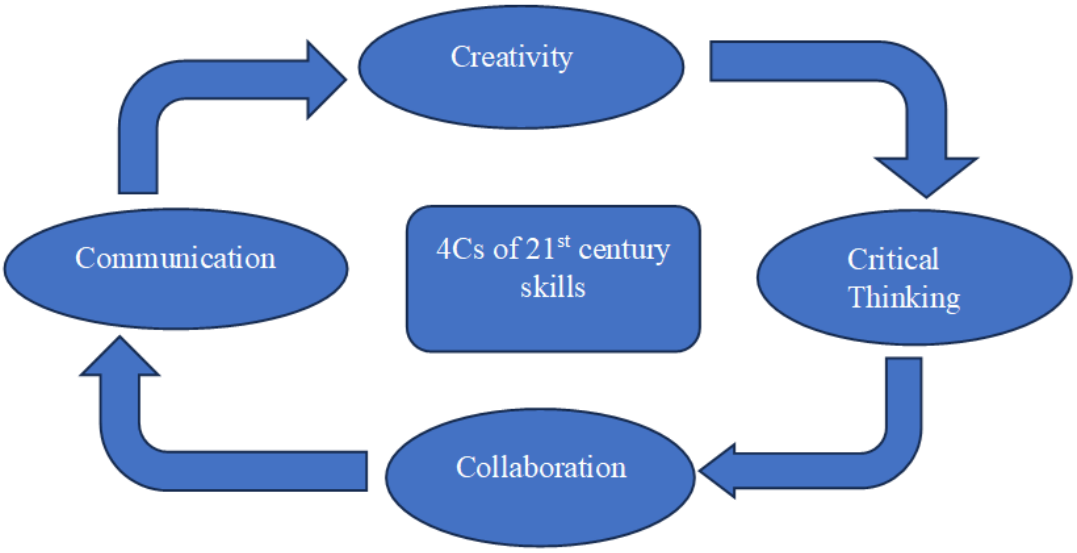
Understanding the Concept of 21st-century skills:

Meaning of 21st-century skills

The term "21st Century Skills" refers to the abilities needed to help a person contend with the problems of the twenty-first century, which is characterized by global activity, digital transformation, collaborative progress, creative advancement, the need for skilled human resources, and a rapid rate of change adoption (Nishank, et al., 2020; Larson & Miller, 2011). In other words, the knowledge, life skills, professional skills, habits, and qualities that are vital to student's success in the present modern world, especially when students shift to college, the work world, and adulthood, are referred to as twenty-first century skills.

Importance of integrating 4Cs into Early Education:

Today's education system was designed for an economy that no longer exists. In the past, mastering reading, writing, and math was enough. But in today's global world, students need to be skilled in communication, creativity, critical thinking, and collaboration with their foundational education.



(Source: https://www.researchgate.net/publication/378710235)

Integrating communication, critical thinking, creativity, and collaboration skills into early education is incredibly important because these 4C skills lay the foundation for lifelong learning and personal development. The 4Cs, or higher-order cognitive skills, are vital for both teachers and students, and they should be incorporated into the curriculum immediately. It is not enough to just include such skills in the curriculum; the problem lies in how they are employed in classrooms. For this reason, the appropriate authorities ought to watch that the 4Cs are carried out in the actual classrooms until it becomes more of a habit than a requirement (Demirkol Orak & Inozu, 2021). The following explains why each is crucial:

Communication: Early education helps children learn to express their thoughts, ideas, and emotions clearly. Strong communication skills are essential for social interaction and academic success. Also, it allows students to articulate their needs, ask questions, and engage with others. Further, this forms the basis for building confidence and effective relationships with others. (Erdoğan, 2019; Khan, et al., 2023; Chiruguru & Reach University, 2020; Nishank, et al., 2020; Scott, 2015).

Critical Thinking: In the era of fast evolution and lots of knowledge, it is very important to be able to think critically, analyse situations logically, and solve challenging issues. Because, as we know the world is shifting so quickly, critical thinking skills help individual solve challenges, stay up to date, and develop novel/original solutions. Children's ability to solve problems is enhanced by early critical thinking practice. It teaches students how to ask valid questions, assess the suitable material, and think new. This cognitive development helps children to understand cause-and-effect relationships and make valid decisions. These are also crucial for students to overcome challenges in school and in their future lives (Erdoğan, 2019; Khan, et al., 2023; Chiruguru & Reach University, 2020; Nishank, et al., 2020; Scott, 2015).

Creativity: Creativity refers to curiosity and imagination. Students are taught to tackle the problems in different ways and generate original ideas whenever they are encouraged to think creatively. This skill is not only needed for creating artwork, but it also benefits other

fields like maths, literature and physics, where creative thinking can lead to novel or original ideas and inventions (Erdoğan, 2019; Khan, et al., 2023; Chiruguru & Reach University, 2020; Nishank, et al., 2020; Scott, 2015).

Collaboration: Children learn how to collaborate with others, develop empathy, and exchange ideas through collaboration. The ability to operate in a team is a key talent in our connected society. Students gain leadership, negotiation, and teamwork skills through group projects, all of which are critical for their academic and future careers (Erdoğan, 2019; Khan, et al., 2023; Chiruguru & Reach University, 2020; Nishank, et al., 2020; Scott, 2015). When taken together, these abilities foster well-rounded development and equip students to be flexible, insightful, and resourceful individuals who can prosper in complicated, fast-paced surroundings. They also help children develop a passion for learning and view obstacles as chances for personal development. Collaborating with others frequently boosts learning engagement. Thinking is enhanced, comprehension is expanded, and new ideas and insights are generated when one shares their own thoughts and responds to others' responses (NCFSE, 2023; NEP, 2020).

Challenges in achieving foundational literacy and numeracy:

- **Low levels of Foundational literacy and numeracy**: India is presently experiencing a learning crisis, with an enormous number of elementary school children lacking the fundamental literacy skills, that is, the capacity to read, understand, and write fundamental texts, as well as numeracy skills. Thus, achieving foundational literacy and numeracy for every child would become a top priority for the country (NEP, 2020; NCF FS, 2022; NCFSE, 2023).
- **Insufficient learning materials**: Currently, the quality of the learning materials utilized to teach language and mathematics across the stages varies, with many of them being of poor quality. A thoughtful selection of age-appropriate, engaging content is essential for high-quality learning resources. For language and mathematics learning, relying solely on textbook information is quite restrictive (NEP, 2020; NCF FS, 2022; NCFSE, 2023).
- **Teachers are not adequately prepared:** Oftentimes, it is assumed that anyone can teach mathematics and language to children without sufficient time for preparation or subject-matter knowledge. This makes language and math learning less successful and makes classes less productive. Despite numerous efforts, India has experienced a significant shortage of qualified teachers of languages and mathematics. For foundational learning to be meaningful and enjoyable for students, teachers must possess the necessary training, enthusiasm, and expertise (NCFSE, 2023). Teachers should understand the professional approach and pedagogical practices needed in a rebuilt classroom, as well as the theoretical foundations of the new curriculum (Khan et al., 2023b; Humaidi et al., 2024).
- **Ineffective pedagogic strategies**: Many prominent teaching methods are not grounded on a solid grasp of how the language works and how children of different ages acquire it. Teachers need to take stock of the strategies they have been using till now for their enjoyability, effectiveness, and ability to engage students meaningfully (Bashir & Jan, 2023). Additionally, a lot of students in the current system tragically have a genuine phobia of mathematics. The way society views and discusses mathematics must change to solve this, but teaching-learning strategies that support students in discovering the value and enjoyment of mathematics as well as assessment techniques that preserve this enthusiasm can also help. This fear may also

be reduced by interactive teaching-learning strategies that incorporate games, puzzles, play, exploration, discovery, and conversation (NCFSE, 2023).

- **Prioritise content completion above competency-based education:** Acquiring competencies is significantly more essential in foundational skills than content mastery. In reality, teachers and assessment developers much too frequently overlook this. The accomplishment of students' competencies and learning outcomes, not just completing the content covered in the textbook, must be the driving force behind effective foundational literacy and numeracy teaching. Despite that, teachers also need to learn how to integrate the 4C skills in their classrooms (Demirkol Orak & Inozu, 2021; NCFSE, 2023).
- **Memory-based assessment**: Instead of assessing both language and mathematical skills, a lot of tests tend to concentrate on evaluating students' remembering of material from textbooks. Recalling specifics of the material could be one way to show that students have learned it, but this is not the main goal of teaching and studying foundational education (NCF SE, 2023).

Strategies to integrate 4Cs and foundational skills in classrooms:

Weaving together foundational skills with 21st-century skills (such as critical thinking, collaboration, communication, and digital literacy) is essential for preparing students to succeed in both academic and real-world settings. Here are some strategies that can help achieve this integration in the classroom:

Project-Based Learning (PBL) and Real-World Application: Develop project-based learning initiatives where students work on real-life problems that require them to use literacy, numeracy, and 21st-century skills together (NEP, 2020; Khan, et al., 2023; Vasoya & Vansdadiya, 2023). For instance, a project on urban planning might involve analysing data (numeracy), writing proposals (literacy), and collaborating in teams (collaboration skills).

Multi-Disciplinary Learning: Design lessons that combine or integrate different subjects (e.g., math, science, history, language, and geography) to foster holistic learning and the application of foundational and 21st-century skills such as 4Cs across disciplines (NEP,2020; NSFSE 2021; Vasoya & Vansdadiya, 2023). An Example: “A lesson on water pollution is a science topic that could involve math (analysing H_2O levels), history (examining environmental policies on water pollution), and literacy (reading papers, articles and policies), with students working together to create a solution to the water problem”.

Peer Teaching and Collaborative Learning: Students should be able to work both independently and collaboratively in the classroom. Teachers may ensure that students work in pairs, in small and large groups, as well as independently (NCFSE, 2023). Collaborative group activities where students communicate and solve problems together: Create opportunities for students to work together and teach each other, which reinforces foundational skills while promoting critical thinking, communication, and collaboration (NEP, 2020; Vasoya & Vansdadiya, 2023; Nishank, et al., 2020; Scott, 2015). An example: “Students work in pairs to solve mathematics problems, where one explains the process of the solution to the other so they can learn together. This develops numeracy skills while also enhancing communication and collaboration skills”.

Inclusion of technology: The mixture of technology into education, it is not just about adding digital tools or equipment to the classroom; it is about enhancing the learning

experience by creating a dynamic, interactive, and student-appropriate environment. As educational technology continues to evolve, it will absolutely open up even more possibilities for creating dynamic and inclusive teaching-learning environments that empower students to succeed in an increasingly digital world. Whether in the classroom or at home, technology is reshaping the future of education, ensuring that learning is not only more engaging but also more accessible and effective (NEP, 2020; NCFSE, 2023; Vasoya & Vansdadiya, 2023). An Example: "Students play math-related games or quizzes where they answer questions about fractions, decimals, or algebra. The platform tracks their progress, offers real-time feedback, and adjusts difficulty levels based on performance". Also, we can use these online videos for enhancing FLN skills, such as e-jadui pitara, YouTube videos, ULLAS, Quizizz, Kahoot, and Story Bird.

Family and Community Engagement: Develop a bond between schools, families, and local communities to promote literacy, numeracy, and skills development (Khan, et al., 2023; NEP,2020). Schools could host community events or workshops that offer families tools to support their children's learning at home, focusing on everyday ways to practice reading, writing, math, and critical thinking. Also**,** provide families with accessible resources and training to integrate literacy and numeracy into everyday life. This could include family-friendly math challenges, reading-aloud initiatives, or engaging discussions about current events that require students to think critically and engage in dialogue (Kumar et al., 2022; NEP, 2020; NCF, 2005; Vasoya & Vansdadiya, 2023).

Continuous Feedback: Provide continuous feedback and remedies to students during the teaching-learning process, helping them to reflect on their own progress, refine their understanding, and adjust their approaches and techniques according to their needs (NCF, 2005; NEP, 2020; NCFSE, 2023). An Example: "After writing an essay on a topic, students are engaged in peer review, giving and receiving feedback to improve both their content (literacy), writing style and argument structure (critical thinking)".

Policy Recommendations:

- The ultimate goal of education will not only be cognitive development but also building character and creating holistic and well-rounded individuals equipped with 21st-century skills (NEP, 2020).
- The OECD's report (2018) emphasised the importance of developing critical thinking, creativity, and collaborative problem-solving. The framework also recognised the need for people to engage with complex global challenges.
- Partnership for 21st Century Learning (P21) Framework (2009) needs to integrate core subjects (such as English, math, and science) with critical thinking, communication, collaboration, and creativity.
- The United Nations' 2030 Agenda for Sustainable Development emphasises the need for holistic education that fosters both academic knowledge and the competencies necessary for addressing global challenges (UNESCO, 1996).

CONCLUSION

Strong foundational literacy and numeracy skills are the foundation on which all other learning is built. The foundational literacy and numeracy abilities provide the basic skills necessary for understanding, processing, engaging and decoding with the fastest world. In a modern society driven by knowledge, innovations, and constant changes, these core skills are very much essential. They prepare individuals to take on more advanced learning and to participate fully in a workforce world that demands creativity, problem-solving ability, and

collaboration. Without a strong foundation in literacy and numeracy, meeting the expectations of today's world becomes difficult. Investing in these skills from an early age helps individuals grow into capable, thoughtful, and adaptable members of their communities.

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Conflict of Interest

The authors have declared that no competing interests exist.

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