

# Identifying 21st-Century Skills In The "Kurikulum Merdeka" At The Elementary Level Numeracy Aspect: A Literature Review

Hilma Syahida<sup>1✉</sup>, Laksmi Dewi<sup>2</sup>

<sup>1,2</sup> Curriculum Development, Universitas Pendidikan Indonesia, Bandung, Indonesia

✉ [hilmasyahida@gmail.com](mailto:hilmasyahida@gmail.com)

**Abstract.** 21st-century skills become an inseparable part of a future life that is currently identical to or leads to society 5.0. To be able to become the next generation that is ready to face all future challenges, 21st-century skills are important to master. Mastery of 21st-century skills is an integral part of the curriculum designed by the government. Objective: This study aims to analyze the application of 21st-century skills in the aspect of numeracy which is identical to mathematics at the elementary level (stages A, B, and C). This research can be a reference for teachers in developing learning methods so that teachers provide learning experiences that train students in mastering 21st-century skills. Method: The research uses a literature review or document studies of Kurikulum Merdeka to analyze 21st-century skills in Learning Outcomes in mathematics at the elementary level. Findings: 21st-century skills are an essential part of mathematics because mathematics is not only about numbers and their operations but also how to understand discourse, take main ideas, and elaborate ideas and solutions, in other words, Mathematics has a close relationship with language skills or good literacy. Conclusion: This study indicates that elementary school mathematics objectives and learning achievements at levels A, B, and C have included 21st-century skills. In this case, we need teachers who have competence in 21st-century skills so that students get a learning experience that leads to the achievement of 21st-century skills.

**Keywords:** 21st-century skills, mathematics, numeracy, kurikulum merdeka

**How to cite:** Syahida, Hilma dan Dewi, Laksmi. (2023). Identifying 21st-Century Skills In The "Kurikulum Merdeka" At The Elementary Level Numeracy Aspect: A Literature Review. *Proceeding The 5<sup>th</sup> International Conference On Elementary Education*, 5(1). 308-314.

## INTRODUCTION

The 21st century provides a new direction in education, which is in line with the growing development of industry 4.0 which is centered on the rapid development of the internet and is used in everyday life or the Internet of Things (IoT) towards society 5.0 proposed by Shinzu Abe Prime Minister of Japan in 2017 in Hannover, Germany CeBIT IT Fair with the statement "Technology is not a threat by society, should be perceived as a support." (Önday, 2020). Society 5.0 puts forward how humans use technology. With the concept of society 5.0, of course there are changes that must be made so that humans are in control of technology, not just as users or connoisseurs of technology. To prepare a generation that is able to take part in society 5.0, the community must be given education and the most massive way in this regard is through education. For this reason, our education must keep up with the times and must be able to facilitate generations in understanding these developments.

In meeting the demands of the times, mastery of 21st century skills is mandatory for students. In line with the direction of Indonesian Education put forward by Nadiem Makarim (Mendikbudristek) in the Freedom to Learn program. Where Indonesian students must have the character of a Pancasila student, one of them among them is critical reasoning (KEMENDIKBUD RI, 2020). In training students to be able to think critically, teachers should have the knowledge and skills of critical thinking skills and how to provide stimulus to students to bring up critical thinking skills.

Some research results related to teachers' higher-order thinking skills, namely: 1) Showing that because there are still many teachers who do not carry out an analysis of HOTS content because they do not understand the concept of HOTS properly (Ratna & Retnawati, 2019; Widana, 2020); 2) Teachers' understanding of HOTS and its application in learning evaluation needs to be improved because some teachers do not understand HOTS, others are not able to prepare student HOTS evaluations (Andromeda, Fitriza, & Aini, 2020); 3) Discovery of experimental inquiry abilities (experimental inquiry), the level of high-order thinking ability of prospective mathematics teachers is in the "low/ low" category. All respondents are at a low level in

generating and testing explanations of the observed phenomena. Likewise with the ability of invention ( invention ), the level of high-order thinking skills of prospective mathematics teachers is in the "low/ low " category . All respondents are at a low level in developing unique results or processes that meet received/perceived needs (Gradini, Firmansyah, & Julia, 2018) ; 4) Knowledge profile of elementary school teachers about Higher Order Thinking Skills in learning mathematics, especially about understanding the meaning and its implementation in learning needs more attention. Required activities by related institutions or other research that focuses on developing elementary school teachers' knowledge about Higher Order Thinking Skills ( Badjeber , Nursupiamin , Wicaksono, & Mufidah, 2020) ; and 5) Teachers' difficulties in carrying out HOTS-based learning arise from several factors, among others, because almost all teachers do not understand HOTS. Educational background is one of the factors that makes it difficult for teachers to implement HOTS-based learning. Another factor is that teachers are approaching retirement age and older teachers are reluctant to take part in HOTS-based learning training. In addition, there is a lack of training in HOTS-based learning ( Miswanto , 2022) .

Apart from higher order thinking skills, there are other abilities needed in the 21st century. Trilling and Fadel explained that the minimum competencies needed in the 21st century are (2009 , pg49-59 ) , 1) Critical thinking skills, meaning that students have deep thinking about a problem or topic and are able to provide reasoning power that can reach the deepest part of the problem. Thinking critically does not mean that you have to be anti- mainstream or different from other people, but you can find the root of the problem and be able to provide the best solution to the problem and draw conclusions. Here in critical thinking students are required to be able to think objectively, view from various perspectives and be open to all possibilities; 2) Collaborative skills, where in collaborating students must be able to (1) demonstrate their abilities effectively according to conditions, (2) be flexible and have a desire to help each other, and (3) share responsibility for group assignments and respect each individual's contribution members of the group; 3) Communication skills, in communicating students can (1) convey thoughts and opinions effectively both orally and in writing verbally and non-verbally, (2) be able to interpret meaning, values, knowledge, attitudes and intentions in conversation, (3) be able to communicate broadly, for example to provide information, motivation, and invitations, (4) be able to use various media and technology and know their effectiveness, and (5) be able to communicate effectively in different environments; and 4) Skills in creativity, with its four main components namely fluency, flexibility, originality, and sophistication. Creative thinking is characterized by fluency in creating new ideas and ideas, flexibility in changing and modifying ideas, unique originality of ideas, and the ability to deepen what is already deep.

All skills exist in the 21st century learning skills can be applied to any learning model. But it would be better to use a project-based, problem-based or discovery-based model. Because these models provide a stimulus for students to use higher order thinking skills. They must be able to find the concept of the problem given, be able to be creative in making projects and be able to solve problems that arise. The teacher can provide a contextual stimulus so that students can think critically because the problems given are close to their lives and are creative in solving problems. Teachers can also provide opportunities for students to carry out research projects in both science and social fields so that students can hone their skills in collaborating with peers and communicating with the people in their environment.

With the content of 21st century skills in learning, this will also have an impact on teacher competencies needed to be able to provide learning experiences that facilitate the mastery of 21st century skills, in among others , namely 1) effective classroom management; 2) Effective teaching practice; 3) effective assessment; 4) skills in using technology ( Nessipbayeva , 2012) . And of course a good understanding of the curriculum that is being implemented, because the successful implementation of the curriculum is part of the teacher's job as curriculum implementer.

At this time, Indonesia is making changes to the national curriculum from the 2013 curriculum to an independent curriculum. This curriculum change cannot be separated from the various problems faced by teachers in its implementation ( Fatmiyati , 2022; Firdaus, Laensadi , Matvayodha , Siagian, & Hasanah, 2022; Nurulaeni & Rahma, 2022) . To be able to find out whether the teacher can provide the expected learning experience and of course hone 21st century skills

means that the teacher must be able to understand the content in the independent curriculum and understand various learning models that are appropriate to the skills that will be mastered by students.

When we discuss 21st century skills, it cannot be separated from the literacy, numeracy and problem solving skills possessed by students. This capability is in the spotlight which is part of the government's focus on the quality of Indonesian education when compared to other countries as measured by the TIMSS ( Trends in Mathematics ) score. and Science Study), PISA ( Programme for International Students Assessment ), one of the countries that got a good score in TIMSS and PISA is Singapore (Tan & Low, 2019, pg 41) . Therefore it is important for mathematics teachers that this is a quite high challenge because mathematics is an integral part of students' numerical mastery. In mastering good numerical abilities, of course, requires a basis for understanding good concepts that have been instilled from an early age by students in elementary schools. For this reason, it is important for elementary school mathematics teachers to analyze learning outcomes in the independent curriculum so they can design lessons that are appropriate for the 21st century.

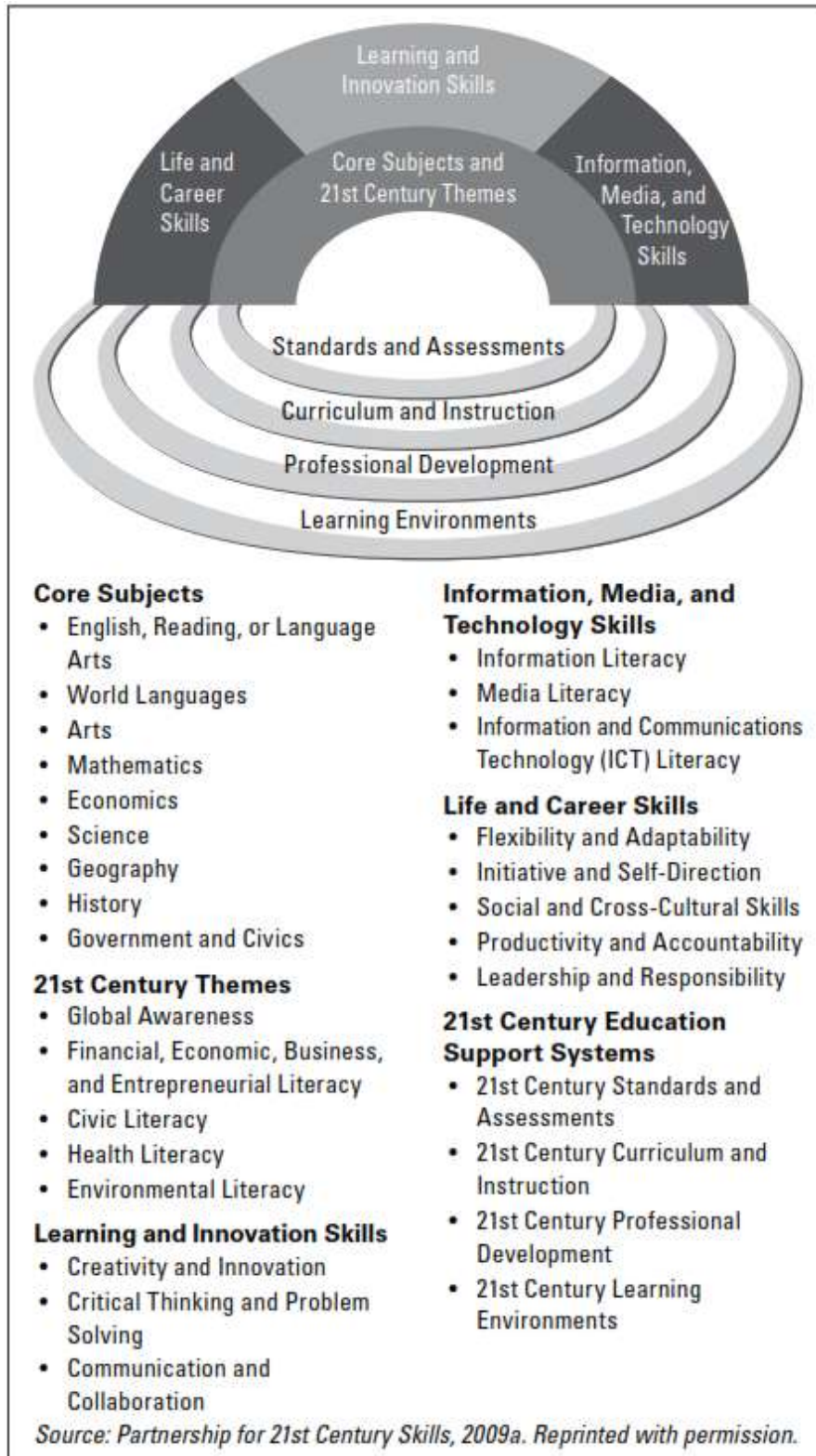
## **METHOD**

This study uses literature studies using various literature from books, journals, reports, evaluations, policies, and so on related to 21st century skills and an independent curriculum.

## **RESULTS**

In the 21st century we need a new educational model due to changes in the world, adjustments to changes, and a clear direction for life in the future ( Bellanca & Brandt , 2010, pg xvii-xix) . Dealing with this change is also not easy for teachers, because teachers want to make changes that accommodate learning models in the 21st century but have limitations in terms of time or expertise (Sang, Liang, Chai , Dong , & Tsai , 2018) . In this discussion, the authors limit research on mathematics subjects in phase A because this phase is the first phase for students to get numerical concepts and because children's thinking is still concrete, it can make teachers miss instilling critical thinking skills, collaborative, creative and effective communication. expected of learning in the 21st century.

To analyze whether learning outcomes contain elements in achieving 21st century skills, teachers must understand and master the 21<sup>st</sup> framework . century skills ( Bellanca & Brandt , 2010, pg . xv) which can be seen from the image below



**Figure 1.** The Partnership for 21st Century Skills Frameworks for 21st Century Learning \_

**Mathematics Learning Achievements in Elementary School phase A**

Based on the Decree of the Head of BSKAP Kemendikbudristek No. 033/H/KR/2022, the achievement of learning mathematics at the end of phase A is showing understanding and having number intuition . sense ) on whole numbers up to 100, including composing (composing) and decomposing (decomposing) these numbers. They can perform addition and subtraction

operations on whole numbers up to 20, and can understand half and quarter fractions. They can recognize, imitate, and reproduce non-number patterns. They can compare lengths, weights, and time durations, and estimate Length using non-standard units. Students can recognize various shapes and shapes, and can arrange and break down flat shapes. They can determine the position of objects relative to other objects. Students can sort, sort, group, compare, and present data using shapes and pictograms for a maximum of 4 categories (BSKAP Kemendikbudristek , 2022).

Next, the teacher lists the elements in 21<sup>st</sup> Century Skills framework contained in learning outcomes. In this case, the teacher must be able to carry out a critical analysis related to what is contained in learning outcomes starting from themes from the 21st century that can be used, skills that can be trained from learning outcomes, skills in using information, media, and technology, as well as life skills that can be used. can be introduced to students. This analysis process is carried out before designing learning and becomes a teacher 's guide in designing learning and what learning experiences will be given to students. In this analysis process, the teacher can record all the elements of 21<sup>st</sup> century framework into the following table

**Table 1.** Analysis of 21st Century Skills

Learning Outcomes/materials	21 <sup>st</sup> century Theme	Learning & Innovation Skills	Information , Media & Technology Skills	Life & Career Skills
Number intuition (ordering and parsing)	-	Communications	ICT Literacy	Self-Direction
Addition and subtraction operations	-	critical thinking	ICT Literacy	Flexibility
Understanding fractions		Creativity , Collaboration	ICT Literacy	social skills
Comparing length, weight & time duration as well as estimated length with non-standard units	-	Creativity and innovation	Information Literacy , Media Literacy , ICT Literacy	Flexibility and Adaptability leadership
Recognize, organize and analyze flat shapes and spaces	-	Creativity , Communication , Critical thinking	ICT Literacy	Self-Direction , adaptability
Sort, sort, group, compare, and present data using shapes and pictograms	Environme ntal literacy	Creativity and Innovation, Critical Thinking and Problem Solving, Communication and Collaboration	Information Literacy, Media Literacy, ICT Literacy	Flexibility, Initiative

Learning achievements in phase A will be achieved for students in grades 1 and 2 of SD. At this level , students are in the early stages of structuring thinking patterns and instilling basic numerical concepts that will influence students' mindsets. To provide a learning experience that includes 21st century skills, it is not enough just to provide learning using HOTS ( High Order Thinking ). Skills ) but for students at this age where they are still at the stage of concrete thinking

(" Educational Learning Theories : 2nd Edition ," 2015) , teacher creativity is needed in designing learning using themes related to the 21st century, using media and technology and practicing life skills.

## DISCUSSION

In learning that contains 21st century skills in phase A, there will often be teacher-centered learning due to the perception that children at this age need guidance and must be explained one by one in order to understand the concepts given which will certainly have an impact on the learning process which is less accommodating, breadth of viewpoints from students. From sharing experiences with allied teachers, the authors found that some teachers found it difficult to organize their learning when providing opportunities for their students to find the desired concept with a limited duration of time so that the teacher returned to using the usual method, namely explaining so that the objectives were achieved in one meeting.

In learning mathematics, numerical skills cannot be separated from verbal abilities. Due to the importance of students' verbal understanding in thinking critically about phenomena in everyday life, thinking creatively in solving problems that arise, and communicating thoughts both in the form of curiosity and providing explanations. Students with good verbal skills will find it easier to understand problems in the form of word problems (Maulida, Annizar , Hidayati, & Mukhlis, 2020) , which will certainly help students in illustrating or expressing them in symbols or mathematical models. In addition to providing learning in class, the teacher must also provide instructions that are clearly understood by students so that the learning objectives are achieved.

## CONCLUSION

Learning in the 21st century does not have to be focused on learning outcomes that contain HOTS elements, but rather on how teachers explore learning outcomes and incorporate the elements contained in 21st-century framework creatively and innovatively. As well as facilitating students to develop their thinking processes which are still concrete in order to be able to see concrete things around them that are related to themes in 21st century learning. at the moment. This treatment will trigger students to think critically, creatively, innovatively, and flexibly.

## REFERENCES

- Andromeda, Fitriza, Z., & 'Aini, F. Q. (2020). Evaluation of Pedagogy Competence of Chemistry Teacher in Compiling Higher Order Thinking Skill (HOTS) Assessment Instrument for High School Students. *Edukimia*, 2(2), 91–95. <https://doi.org/10.24036/ekj.v2.i2.a134>
- Badjeber, R., Nursupiamin, N., Wicaksono, A., & Mufidah, M. (2020). Profil Pengetahuan Guru Sekolah Dasar tentang Higher Order Thinking Skill dalam Pembelajaran Matematika. *Al-Khwarizmi: Jurnal Pendidikan Matematika Dan Ilmu Pengetahuan Alam*, 8(2), 133–144. <https://doi.org/10.24256/jpmipa.v8i2.1519>
- Bellanca, J., & Brandt, R. (2010). *21st Century Skills: Rethinking How Students Learn*. United States of America: Solution Tree Press.
- BSKAP Kemendikbudristek. *Keputusan Kepala BSKAP Kemendikbudristek No. 033/H/KR/2022*. , (2022). Indonesia.
- Educational Learning Theories: 2nd Edition. (2015). In M. Y. Zhou & D. Brown (Eds.), *Educational Open textbook*. Georgia: Galileo University System of Georgia. Retrieved from <https://oer.galileo.usg.edu/education-textbooks/1>
- Fatmiyati, N. (2022). Persepsi Guru Kelas Dalam Menerapkan Kurikulum Merdeka Belajar Di SDN 140 Seluma Pada Materi Matematika. *JPT: Jurnal Pendidikan Tematik*, 3(3), 19–23.
- Firdaus, H., Laensadi, A. M., Matvayodha, G., Siagian, F. N., & Hasanah, I. A. (2022). Analisis Evaluasi Program Kurikulum 2013 dan Kurikulum Merdeka. *Jurnal Pendidikan Dan Konseling*, 4(4), 686–692. Retrieved from <https://core.ac.uk/download/pdf/322599509.pdf>
- Gradini, E., Firmansyah, B., & Julia, N. (2018). Calon Guru Matematika Melalui Level Hots Marzano. *EduMa*, 7(2), 41–48.
- KEMENDIKBUD RI. (2020). *Merdeka Belajar Episode 5: "Guru Penggerak."* Indonesia. Retrieved from <https://youtu.be/X6vP4AkEsLM>

- Mauliyda, M. A., Annizar, A. M., Hidayati, V. R., & Mukhlis, M. (2020). Analysis of students' verbal and written mathematical communication error in solving word problem. *Journal of Physics: Conference Series*, 1538(1). <https://doi.org/10.1088/1742-6596/1538/1/012083>
- Miswanto, W. (2022). Analisis kesulitan guru sekolah dasar dalam pembelajaran matematika berbasis higher order thinking skills (hots). *Mahesa Center*, 1(1), 143–150. <https://doi.org/10.34007/ppd.v1i1.182>
- Nessipbayeva, O. (2012). The Competencies of the Modern Teacher. In *Bulgarian Comparative Education Society*. Bulgaria. Retrieved from <http://bit.ly/2fRwNoY>
- Nurulaeni, F., & Rahma, A. (2022). Analisis Problematika Pelaksanaan Merdeka Belajar Matematika. *Jurnal Pacu Pendidikan Dasar*, 2(1), 35–45. Retrieved from <https://unu-ntb.e-journal.id/pacu/article/view/241>
- Önday, Ö. (2020). Society 5.0-Its Historical Logic and Its Structural Development. *Journal of Scientific Reports*, 2(1), 32–42. <https://doi.org/10.5281/zenodo.3731954>
- Ratna, A. M., & Retnawati, H. (2019). Content Analysis of Higher Order Thinking Skills (HOTS) in Mathematics National Exam. *Journal of Physics: Conference Series*, 1320(1). <https://doi.org/10.1088/1742-6596/1320/1/012067>
- Sang, G., Liang, J. C., Chai, C. S., Dong, Y., & Tsai, C. C. (2018). Teachers' actual and preferred perceptions of twenty-first century learning competencies: a Chinese perspective. *Asia Pacific Education Review*, 19(3), 307–317. <https://doi.org/10.1007/s12564-018-9522-0>
- Tan, O., & Low, W. L. E. (2019). Teacher Education in the 21st Century. In O.-S. Tan, W.-C. Liu, & E.-L. Low (Eds.), *Singapore's Evolution and Innovation*. Singapore: Springer. <https://doi.org/10.1007/978-981-10-3386-5>
- Trilling, B., & Fadel, C. (2009). *21st Century Skills, Enhanced Edition: Learning for Life in Our Times*. San Francisco: John Wiley & Sons Inc.
- Widana, I. W. (2020). Pengaruh Pemahaman Konsep Asemen HOTS terhadap Kemampuan Guru Matematika SMA/SMK Menyusun Soal HOTS. *Jurnal Emasains: Jurnal Edukasi Matematika Dan Sains*, 9(1), 66–75. <https://doi.org/https://doi.org/10.5281/zenodo.3743923>