

Website-Based Learning: Optimizing Students' Numeracy Skills

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Abstract. The evaluation of the Independent Curriculum (Kurikulum Merdeka) is currently underway, employing various methods such as the Minimum Competency Assessment (Asesmen Kompetensi Minimum [AKM]). AKM assesses general yet fundamental competencies, including numeracy skills. This assessment method endeavors to delineate students' numeracy skills within the context of website-based learning. Employing a descriptive qualitative method, the study involves 20 eighth-grade students from a Junior High School in Ciamis, West Java, Indonesia. Students are instructed to access a website developed by the researchers, featuring study materials and example problems. Throughout the learning activities, students utilize the Google Meet video conferencing application, activating their cameras for interactive sessions. Following the lesson, students undergo a numeracy skills test comprising validated questions. The research outcomes unveil three distinct levels of numeracy skills among students: high, medium, and low. Those with high-level numeracy skills demonstrate proficiency in mathematical numeracy skills indicators but exhibit errors in applying formulas. Conversely, students with moderate and low mathematical numeracy skills commonly struggle with concept comprehension, identifying relevant formulas, and making calculation errors.

Keywords: Mathematical Numeracy Skills; Mathematics Learning; Students' Competency; Website-Based Learning

Abstrak. Evaluasi Kurikulum Merdeka saat ini sedang dilakukan dengan menggunakan berbagai metode seperti Asesmen Kompetensi Minimum [AKM]). AKM menilai kompetensi umum namun mendasar, termasuk keterampilan numerasi. Metode penilaian ini berupaya untuk menggambarkan keterampilan numerasi siswa dalam konteks pembelajaran berbasis website. Dengan menggunakan metode deskriptif kualitatif, penelitian ini melibatkan 20 siswa kelas VIII dari salah satu Sekolah Menengah Pertama di Ciamis, Jawa Barat, Indonesia. Siswa diinstruksikan untuk mengakses website yang dikembangkan oleh peneliti, yang menampilkan materi dan contoh soal. Sepanjang kegiatan pembelajaran, siswa memanfaatkan aplikasi konferensi video Google Meet dengan mengaktifkan kamera mereka untuk sesi interaktif. Setelah pelajaran, siswa menjalani tes keterampilan numerasi yang terdiri dari pertanyaan-pertanyaan yang divalidasi. Hasil penelitian mengungkap tiga tingkat keterampilan numerasi yang berbeda di kalangan siswa: tinggi, sedang, dan rendah. Siswa yang memiliki keterampilan numerasi tingkat tinggi menunjukkan kemahiran dalam hampir semua indikator keterampilan numerasi matematika namun menunjukkan kesalahan dalam menerapkan rumus. Sebaliknya, siswa dengan kemampuan numerasi matematika sedang dan rendah biasanya kesulitan dalam memahami konsep, mengidentifikasi rumus yang relevan, dan membuat kesalahan perhitungan.

Kata kunci: Keterampilan Numerasi Matematis; Kompetensi Siswa; Pembelajaran Berbasis Website; Pembelajaran Matematika



INTRODUCTION

Learning mathematics in the 21st century focuses for increase critical thinking skills, connecting knowledge with the real world, mastery technology, communication, and collaboration. For reach those skills here, students need own numeracy skills (Janah et al., 2019) . Numeracy skills are something important skill for students, because with numeracy it's possible for students to overcome various problem math is happening in everyday life. This thing in line with (Ekowati et al., 2019) that numeracy skills can defined as skills somebody in develop, apply, and interpret draft mathematics in various context. It involves the skills to do reasoning logically as well as use concepts, procedures, and facts mathematics. For describing, explain or estimate phenomenon or incident. Aningsih (2018) states that numeracy is not only related with operate procedure in finish problem mathematics, but also involving application mathematics in life every day, like becoming literate or skilled in understanding and use mathematics.

Skills numeracy is one method in helping individuals understand the role of mathematics in life every day and become base important in taking decisions by society (The Organisation for Economic Co-operation and Development [OECD], 2019). Numeracy involves knowledge and skills in (a) use numbers and symbols mathematics base for solve problem practical in various context life every day, (b) analyze information presented in various form like graphs, tables, or map and (c) use interpretation for predict and create decision (Han, 2017). Numeracy skills are very important for students because related to the skills they in solve problem mathematics in life every day (Pangesti, 2018).

Numeracy is one competency being evaluated in Asesmen Kompetensi Minimum (AKM). This evaluation is expected to become the base for teachers, schools, and government to repair in the process of learning and improving quality learning. The goal is increasing study performance of students and improve Indonesian values in *Program for International Student Assessment (PISA)* (Suprayitno, 2019). Unfortunately, until latest PISA results in 2018, Indonesia has not capable inked good performance in skills literacy and numeracy.

The conditions above emphasize that skill numeracy in learning mathematics become an important and necessary thing to improve in Indonesia, for the generation young (Purbaningrum et al., 2022). In improving skills numeracy, it is important to understand influencing factors skills numeration, and methods to overcome difficulty moment study numeracy. Due to increase or practice skills numeracy this generally not there is meeting specifically in class, then important for educator use or develop something method for practice skills numeracy student. The way it feels more optimal, namely utilize technology so that students can study no limited just in space class. As stated by Ali & Lestari (2023) it is important to change innovation in the learning process, with the use of technology for more interesting for participants educate.

In practice, teachers often feel difficulty for developing learning media because assignments given outside teaching hours. Teachers tend to using existing media there is without once develop media with use digital technology. For overcome this problem, one considered solution appropriate among them developing learning media use website. This media has its own ability for displays information in various shape, like text, video, and audio (Suprianto, 2019). Research conducted by (Winarni et al., 2021) disclose that use of learning videos mathematics can influential to ability numeracy participant educate.

According to (Halat, 2013) web activities have advantages compared to the use of social media, because they can be learned quickly. The use of website-based media was chosen because it was proven to have the potential to help in solving learning problems, especially in mathematics material to improve numeracy skills (Tseklevs, et al., 2016). In addition, the use of websites was chosen because it has a significant impact in increasing student involvement in the learning process (Lo, et al., 2012). This is also supported by research (Suprianto et al., 2019) which reveals that the use of website media can be effective in improving students' learning performance.

Support that website media can be used to conduct discussions and enter mathematical answers such as fractions, which can be reviewed by other students and teachers has been discussed in the results of previous research. Apart from that, website media also allows students to review their work (Azid et al., 2020). According to (Chin-Fei & Chia-Ju, 2012), the use of website media has the potential to increase students' motivation in learning, compared to using textbooks. Based on the explanation above, this research describes the numeracy abilities of eighth-grade students after conducting website-based learning.

METHOD

Research methods used in study is descriptive qualitative, the aim of conducting research is to describe students' numeracy abilities through website-based learning. Study implemented in eighth-grade in one of the state junior high schools in the district Ciamis, West Java, with research subjects of 20 students. Research subjects were taken with the following considerations: (a) Chromebook devices that can be used as many as 20 devices, (b) Students who have adequate time, (c) Students who are able to express their thoughts both orally and in writing.

Data collection techniques in this research are observation, questionnaires, tests and interviews. Questionnaires are used to see and find out students' responses after website-based learning. The test used is 5 (five) questions on numeracy skills related to plane material and presented in multiple choice form. In indicator question number 1, given several pictures, students are able to draw conclusions from the contextual problem given by using the concept of area of quadrilaterals and triangles, indicator question number 2, given a picture, students are able to solve

contextual problems using the concept of area of flat shapes. Indicator question number 3, given an image, students are able to solve contextual problems using the concept of area of flat shapes. Indicator for question number 4, given a picture, students are able to solve contextual problems using the concept of perimeter of flat shapes and indicator for question number 5 is given a picture, students are able to determine the truth of the statement given using the concepts of area and perimeter of flat shapes. The numeracy skills questions used were adopted from (Noviantini, 2023) which has been validated. The interviews in this study used semi-structured interviews with the aim of finding out more extensive and open information about how the subjects solved the test questions.

The implementation stages consist of website-based learning, giving tests, filling out response questionnaires and interviews with selected subjects. After carrying out the test, students' work results are automatically checked and can be grouped based on categories, namely high, medium and low skills. The grouping of numeracy abilities based on test results refers to Ma'sum's opinion (Khoirudin et al., 2017) in Table 1.

Table 1. Numeracy Skills Categories

Categories	Value Range
High	71-100
Mediocre	41-70
Low	0-40

Student test results are given a score according to the scoring rubric and indicators of numeracy skills. Data is used as a reference for selecting subjects from each category. After selecting 3 subjects from each category, they were then analyzed. Test data analysis is carried out by matching the test results and then being interviewed about the completion procedure. The indicators of numeracy skills can be seen in Table 2 (Han et al., 2017).

Table 2. Numeracy Skills Indicator

No	Indicator
1.	Using various kinds of numbers and symbols related to basic mathematics to solve problems in various contexts of daily life
2.	Analyze information displayed in various forms (graphs, tables, charts, diagrams and so on)
3.	Interpret the results of the analysis to predict and make decisions

RESULTS AND DISCUSSION

Students first access the website link that has been provided to be able to read the study material available on the website. The website used is a website developed by researchers with the link <https://belajarkalkulus.com/geometri-2-dimensi/>. Then students are directed to enter the Google-Meet link that is available and activate the camera, with the aim that when website-based learning takes place, students can be monitored directly and via Google-Meet by paying attention to

students' eye movements. After students are given the material and sample questions available on the website, they continue with filling in the concept check questions. Providing question types C1 to C3 in concept check questions is an activity to ensure students' knowledge, understanding and application of flat shape material.

After implementing website-based learning, students are instructed to take tests available on the web, and students are given answer sheets which can be used as sheets for calculating tests that will be collected after completing learning.

The following shows a description of the numeracy skills test results data from eighth-grade students with assessments referring to the scoring rubric and numeracy indicators according to (Han et al., 2017). The data is presented in Table 3.

Table 3. Numeracy Skills Test Results

Subject	Skor	Categories	Subject	Skor	Categories
S1	20	Low	S11	40	Low
S2	60	Mediocre	S12	40	Low
S3	40	Low	S13	100	High
S4	40	Low	S14	20	Low
S5	40	Low	S15	20	Low
S6	40	Low	S16	100	High
S7	40	Low	S17	100	High
S8	20	Low	S18	40	Low
S9	80	High	S19	60	Mediocre
S10	80	High	S20	40	Low

Subject selection means selecting one person from each group with different abilities. High skills selected 1 subject, namely S13, medium skills selected 1 subject, namely S2, and low skills selected 1, namely S8.

High Level Students' Mathematical Numeracy Skills

Researchers analyzed the answers to the mathematical numeracy abilities of high-level students. The students selected for high level mathematical numeracy skills were S13. The results of the S13 mathematical numeracy skills test appear to have met the indicators, namely using numbers or symbols related to basic mathematics, analyzing information displayed in various forms and interpreting the results of the analysis to draw conclusions from the calculations that have been carried out. S13 is still wrong in distinguishing the basic concepts of area and perimeter of a flat shape. However, in a way answer S13 is capable do question with correct for 13 seconds. According to (Agustina, 2018) factors that trigger errors are the lack of memorizing formulas by

students, the inskills of students to remember formulas well, not being careful in reading questions, not being accurate in doing calculations, being in a hurry, lacking understanding of the material, as well as a lack of practice in solving story problems.

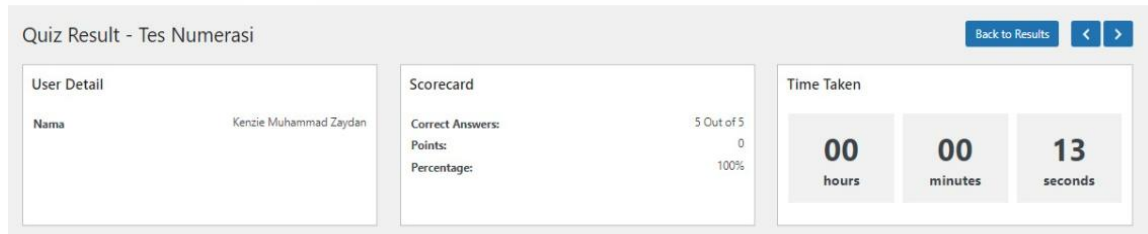


Figure 1. Recap Answer S13

In the website-based learning process, S13 looked enthusiastic and enthusiastic and increased his interest in learning, especially in plane material. The results of the interview showed that S13 felt enthusiastic and motivated when website-based learning was more fun and not boring. Website learning media can be used as an effort to increase students' interest in learning (Meduri, Firdaus & Fitriawan, 2022). Learning media functions as a means of visualization for students, which means that learning media can provide an overview of material concepts, increase interest and motivation to learn (Muhammad et al., 2020). Delivery material although still felt not yet maximum in this *website*, however capable understood with good by S13.

Mathematical Numeracy Skills of Medium Level Students

Researchers analyzed the results of answers to the mathematical numeracy abilities of medium level students. The students selected for moderate level mathematical numeracy abilities are S2. The results of the S2 mathematical numeracy skills test show that he can use numbers or symbols related to basic mathematics and can analyze information displayed in the form of images. In the third indicator, S2 is unable to interpret the results of the analysis and determine conclusions in making decisions. On the matter number 1, S2 only capable interpret wide land in picture and yet skilled count with price existing land, whichever is more profitable like seen in Figure 2.

Soal nomor 1
Ayah ingin membeli sebidang tanah untuk usaha pertaniannya. Pak Rudit menawarkan 2 lokasi kepada Ayah yaitu sebagai berikut.

Tanah tipe 1

Tanah tipe 2

Jika Ayah memiliki uang tabungan sebesar Rp.270.000.000,- dan harga tanah Rp.6.000.000,- per meter², maka yang dilakukan Ayah adalah

- A. Tidak jadi membeli salah satu tanah karena uang tabungan tidak cukup
- B. Memilih tanah tipe 1, sehingga tabungannya habis digunakan seluruhnya
- C. Memilih tanah tipe 2, sehingga tabungannya habis digunakan seluruhnya
- D. Memilih tanah tipe 2, sehingga memiliki sisa uang untuk membeli tanaman

Figure 2. S2's answer to Question Number 1

However, skills numeration that becomes focus in question the is how interpret calculation mathematics in life daily. As written by (Mahmud & Pratiwi, 2019) explain that students' numeracy literacy skills are in solving everyday problems. The difficulty encountered is in formulating conclusions from a problem. S2 has shortcomings in directing the analysis of information that has been carried out, especially in planning and implementing the strategies needed to find a solution to a problem. This is in line with (Farida, 2015) Students misunderstand the information given, this is because students do not pay attention to the meaning of the questions. According to (Sari et al., 2021), students still make mistakes when analyzing information, this is due to errors in understanding questions and interpreting problems.

The results of the interview showed that S2 stated that this website-based learning was very interesting and did not make him bored. Innovative and fun learning. During website-based learning, S2 looks serious and cooperative. S2 indeed not yet capable do all question, there is factor forget from results interview. However, S2 mentions that occasionally studying mathematics through *Chromebooks* is a lot of fun. When learning based *website*, S2 is visible serious and cooperative. Although there is delivery little material make confused S2, but with read several times repeat, finally can be understood. This is supported by (Setiadi & Setiyani, 2018) stating that website media is an effective and efficient medium in delivering learning material and activities so that students become more active.

Mathematical Numeracy Skills of Low Level Students

Researchers analyzed the results of low-level students' mathematical numeracy skills answers. The students selected for low level mathematical numeracy abilities were S8. Test results skills numeracy S8 mathematics only 1 (one) question is correct deep the process, 4 (four) questions others are wrong. The results of S8's mathematical numeration skills test showed that he was unable to use the concept of plane material and errors occurred because he was unable to identify the formula that needed to be applied to solve the problem, caused by memory loss regarding the formula that should be used. Students with low skills do not meet the three indicators of numeracy skills. This is because S8 does not follow website-based learning well. S8 visible no focus when researcher give instruction during learning use *website*. With arguments indeed not enough understand medium material studied, S8 has difficulty in finish question.

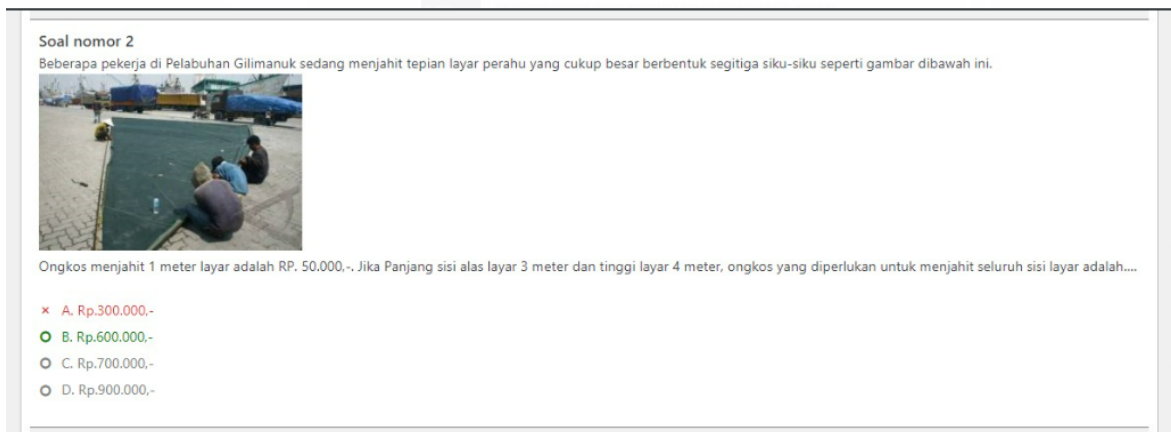


Figure 3. S8's answer to Question Number 2

The results of the interview showed that S8 stated that the students found it difficult to understand the story, even though they had read it several times, they still didn't understand it. He felt lazy to read and understand the meaning of the question. This is in line with (Utari et al., 2019) which states that students' difficulties in solving word problems are caused by several factors, including IQ and students' attitudes towards learning mathematics.

CONCLUSION

Based on the research results, students' mathematical numeration abilities through website-based learning are still not optimal. This can be seen from the test results which show that the mathematical numeration skills of high level students is only 5 (five) people, the mathematical numeration skills of medium level students is 2 (two) people and the mathematical numeration skills of low level students is 13 (thirteen) people. Students with a high level of mathematical numeration skills have met the indicators of mathematical numeration skills but still experience errors in determining the use of formulas, while students with mediocre and low levels of mathematical numeration skills mostly make mistakes in understanding concepts, are unable to identify formulas in solving problems and errors in calculations. They need study advanced especially how represent good material on that website. Limitations in study this that is no consider ability participant educate in represent material on the website.

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