

DOI <https://doi.org/10.30740/jee.v6i1p49-57>

# MATHEMATICAL RESILIENCE AND LITERACY ABILITY THROUGH BLENDED LEARNING IN MATHEMATICS LEARNING

**Sukma Murni<sup>1</sup>, Dadang Juandi<sup>2</sup>**<sup>1</sup>IKIP Siliwangi, Cimahi<sup>2</sup>Universitas Pendidikan Indonesia, Bandung[sukma-murni@ikipsiliwangi.ac.id](mailto:sukma-murni@ikipsiliwangi.ac.id), [dadang.juandi@upi.edu](mailto:dadang.juandi@upi.edu)

Received: January 2023; Accepted: January 2023

**Abstract**

This research is motivated by the low ability of students' resilience and mathematical literacy which will affect their competence as a teacher. Amid the current conditions of the Covid-19 Pandemic, learning in schools, both in tertiary institutions, is constrained, so one of the right solutions at this time is the implementation of the Blended Learning learning model in learning, especially learning mathematics. Facing the current situation, we are required to be tough and strong, therefore we must have resilience skills so that students are resilient in facing any conditions. With the application of the Blended Learning model in mathematics learning, it is hoped that it can improve students' resilience and mathematical literacy abilities. The research method is a mixed method between qualitative built quantitative with a sequential exploratory strategy. The research instruments used were resilience questionnaire sheets and mathematical literacy test questions. The research procedure begins with qualitative data collection and then builds toward quantitative, the results of which will then be interpreted. The results showed that there was an increase in the ability of mathematical resilience and literacy using Blended Learning with a percentage of 31% and 59% respectively.

**Keywords:** Mathematical Resilience, Mathematical Literacy, Blended Learning**Abstrak**

Penelitian ini dilatarbelakangi oleh rendahnya kemampuan resiliensi dan literasi matematis mahasiswa yang akan mempengaruhi kompetensi mereka saat menjadi seorang guru. Ditengah-tengah kondisi Pandemi Covid-19 saat ini, pembelajaran di sekolah baik di perguruan tinggi terkendala, sehingga salah satu solusi yang tepat saat ini dengan diterapkannya model pembelajaran Blended Learning dalam pembelajaran terutama pembelajaran matematika. Menghadapi situasi saat ini, kita dituntut harus Tangguh dan kuat, oleh karenanya haruslah kita memiliki kemampuan resiliensi agar siswa/mahasiswa bersifat resilien dalam menghadapi kondisi apapun. Dengan diterapkannya model Blended Learning dalam pembelajaran matematika diharapkan dapat meningkatkan kemampuan resiliensi dan literasi matematis mahasiswa. Metode penelitiannya adalah metode campuran antara kualitatif dibangun kearah kuantitatif dengan strategi Exploratoris Sekuensial. Instrumen penelitian yang digunakan adalah lembar angket resiliensi dan tes soal literasi matematis. Prosedur penelitian diawali dengan pengumpulan data secara kualitatif kemudian dibangun kearah kuantitatif, yang selanjutnya akan diinterpretasi hasilnya. Hasil penelitian menunjukkan terdapat peningkatan kemampuan resiliensi dan literasi matematis menggunakan Blended Learning dengan masing-masing persentasenya 31% dan 59%.

**Kata Kunci:** Resiliensi Matematis, Literasi Matematis, Blended Learning

***How to Cite:*** S. Murni-1, D. Juandi-2. (2023). Mathematical Resilience And Literacy Ability Through Blended Learning In Mathematics Learning. (*JEE*), 6 (1), 49-57.

---

## INTRODUCTION

The demand for students' abilities in mathematics is the ability to reason logically and critically in solving problems, not just the ability to count. The abilities tested in PISA are grouped into process components (OECD, 2010), namely understanding and problem-solving abilities, reasoning abilities, and communication skills. The literacy questions in the PISA study require reasoning and problem-solving abilities that emphasize various problems and situations in everyday life. In line with that, the Regulation of the Minister of National Education in Indonesia Number 22 of 2006 has accommodated and aligned with the development of mathematical literacy. The purpose of mathematics lessons is mentioned so that students can understand, use reasoning, solve problems, communicate and have an attitude of respect for mathematics. Solving this problem is more to the problems faced daily, not only problems in the form of routine questions. Such mathematical abilities are known as mathematical literacy abilities (Sari, 2015). Someone literate in mathematics can use it in solving everyday problems, not just understanding mathematics.

To improve this mathematical literacy ability, teachers, government, as well as education observers and education policyholders need to first understand the subject of mathematics learning, especially in Indonesia which is very diverse. Junior High Schools in Indonesia are the subject of the PISA study, one of which is to see students' mathematical literacy skills. There is nothing wrong if students are used as learning subjects to develop these mathematical literacy skills. Because college students are required to have higher thinking skills than elementary/junior/high school students, their mathematical literacy abilities must also be more developed and improved, as prospective teachers. Literacy is a human right and the basis for lifelong learning and covers various aspects of life, one of which is the need for mathematical literacy (Mahdiansyah and Rahmawati, 2014).

Currently, Indonesia and even the world are being hit by the Covid-19 pandemic, which has an impact on all aspects of life, especially education. During the pandemic, learning was not carried out normally as usual because it was feared that the number of Covid-19 would increase, but other alternatives were needed to keep the teaching and learning process going at all levels. One alternative is to apply online learning (in the network).

Seeing the fluctuating conditions due to the current Covid-19 pandemic, the regulations have changed according to the current situation. Offline learning regulations have begun to be tested in schools and universities in rotation. These conditions give us an illustration that at any time these regulations can change back to online or offline learning. So that there is a need for other solutions in dealing with problems, we must be able to face these fluctuating conditions with strong resilience.

Mathematical resilience is needed when the teacher intends to educate students to use mathematics and to think and behave mathematically and not just to get good grades or pass math exams. Students with strong resilience will also have the necessary mathematical skills to answer exam questions. More importantly, they also have the math skills needed outside of

school and are willing to apply them whenever needed. This is also a must-have in mathematical literacy skills. The development of mathematical resilience also requires a reflective and sensitive attitude toward learning mathematics, this is similar to the ability to think critically. Students with good mathematical resilience realize that if they think hard, discuss with their friends, read mathematical ideas and reflect on the knowledge they have acquired. Then they will also be tough and able to overcome obstacles in learning mathematics and be able to solve difficult mathematical problems.

Many models/methods/approaches can be applied to learning mathematics. However, one of the approaches that will be applied in this research and are expected to be able to develop resilience and mathematical literacy skills is Blended Learning. His research aims to examine the ability of resilience and mathematical literacy through Blended Learning in learning mathematics. Based on the background of these problems, clarification is needed regarding the relationship between resilience abilities and mathematical literacy skills through Blended Learning in mathematics learning, there are several research problems as follows:

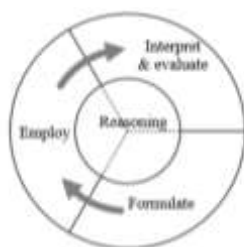
1. How to implement Blended Learning on resilience and mathematical literacy abilities in learning mathematics?
2. Is there an increase in mathematical resilience and literacy skills using Blended Learning?

### **Mathematical Literacy**

Mathematical Literacy is an individual's capacity to reason mathematically, formulate, use, and interpret mathematics to solve problems in various real-world contexts. It includes concepts, procedures, facts, and tools to describe, explain and predict phenomena. This capacity helps individuals know the role of mathematics in the world of life, to be able to make reasoned judgments and make decisions needed as a constructive (building, repairing, building, and so on) 21st-century citizen, participatory (one's involvement in a situation both physically and mentally), mental, thoughts or emotions and feelings), and reflective (involuntary body movements) (OECD, 2021).

It is important to note that the definition of mathematical literacy does not only focus on using mathematics to solve real-world problems, but also identifies mathematical reasoning as a core aspect of mathematical literacy. The contribution that the PISA 2021 framework makes is to highlight the centrality of mathematical reasoning to both the problem-solving cycle and mathematical literacy in general.

Figure 1 illustrates the relationship between mathematical reasoning (deductive and inductive) and problem-solving as reflected in the PISA 2003 and PISA 2012 mathematical modeling cycles.



**Figure 1. Mathematical Literacy: Relationship between Mathematical Reasoning and Problem Solving Cycle (Modeling)**

## Resilience

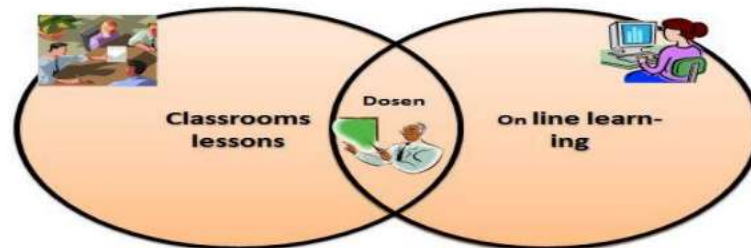
Dweck (Sumarmo, 2015: 1) suggests that mathematical resilience includes a diligent or persistent attitude in facing difficulties, working or learning collaboratively with peers, having language skills to express mathematical understanding, and mastering mathematical learning theory.

Students with strong mathematical resilience will do well in mathematics at school even in unfavorable conditions. Adolphs and Damasio (Sumarmo, 2015:2) say that they have attitudes: adaptive or able to adapt to the environment; be able to deal with uncertainties, problems, and challenges; solve problems logically adapt to the environment; be able to deal with uncertainties, problems, and challenges; solve problems logically and flexibly; seek creative solutions to challenges, are curious and learn from experience, have self-control; aware of his feelings; have a strong social network and easily provide assistance.

Another expert Newman (Sumarmo, 2015: 2) defines mathematical resilience as a quality attitude in learning mathematics which includes: confidence in its success through hard effort; showing persistence in the face of adversity; being willing to discuss, reflect, and research. This resilience allows students to overcome obstacles in learning mathematics. Any learning required resilience. But that does not mean that mathematical resilience is the result of various factors such as the type of learning, the nature of mathematics, and the view that mathematical ability is fixed.

## Blended Learning Models

Blended learning comes from the words blended and learning. blend means to mix and learning means learning. Blended learning combines face-to-face learning in class and online learning to increase active independent learning by students and reduce the amount of face-to-face time in class. According to Husamah (2014), blended learning is learning that combines various ways of delivery, teaching models, as well as a variety of various technological media. Therefore, students are expected to be active learners and able to understand the material.



**Figure 2. Illustration of Blended Learning**

Blended learning is one of the newest educational issues in the development of globalization and technology. Many institutions or practitioners have developed and provided definitions in their language, according to the typology of blended learning practice itself. According to Rusman (2012) that:

Blended Learning is a combination of the characteristics of traditional learning and an electronic learning environment or Blended Learning, by combining web-based learning, video

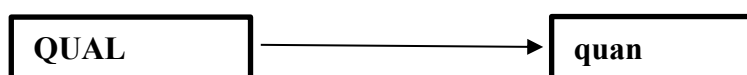
streaming, and synchronous and asynchronous audio communication with traditional face-to-face learning.

It can be concluded, in simple terms blended learning is said to be a combination or combination of various aspects including web-based learning, video streaming, audio, and communication with traditional learning systems, and also includes methods, learning theories, and pedagogic dimensions.

## **METHOD**

As the research objectives stated above, to determine research data, researchers must collect qualitative and quantitative data, thus the research method used is mixed.

The research method used in this study is mixed (Mixed Methods Research) between qualitative built quantitative and Exploratory Sequential strategies (Creswell, 2014). In this strategy, the mixing of two data occurs when researchers compare one data source with another data source. Beginning with qualitative data collection then build towards quantitative, which will then be interpreted as the results. Here's the design:



**Figure 3. Mixed Methods Research Design**

The research subjects were 31 students of PGSD IKIP Siliwangi.

## **RESULTS AND DISCUSSION**

Before the research was carried out, the researcher conducted a preliminary study to see how the resilience and mathematical literacy skills of students. Then prepare tools for conducting research, such as making teaching materials, making instruments, validating instruments, making lesson plans, and so on.

Next, the researcher analyzed the resilience and mathematical literacy abilities of 31 students. The results of the analysis will be explained next, then the researcher arranges learning tools using Blended Learning before carrying out learning.

The following are the stages of research using the Blended Learning model in learning mathematics at PGSD;

1. Create a learning drafting concept
2. Collecting literature studies
3. Develop learning tools
4. Expert validation of the tools that have been compiled
5. Editing devices that have been validated
6. Carry out learning with the Blended Learning model
7. Perform data processing
8. Prepare research reports

Before learning is carried out, students are given pretest questions. After that, learning was carried out using the Blended Learning model. The last activity is the post-test, the post-

test results show a better overall improvement. According to Ramsay (2001), the syntax or steps of the Blended Learning learning model are as follows,

1. Search for information online and offline based on relevance, validity, content reliability, and academic clarity,
2. Finding, understanding, and confronting ideas or ideas,
3. Information or knowledge from various sources that have been sought from various sources,
4. Communicating ideas or ideas resulting from their interpretation using online or offline facilities,
5. Construct knowledge through a process of assimilation and accommodation from the results of analysis, discussion, and drawing conclusions from information obtained using online or offline facilities.

After analyzing students' resilience and mathematical literacy, then before and after being given learning using the Blended Learning model, students are given a pretest and posttest to find out how far they can solve the questions before and after learning is applied. Indicators of student mathematical resilience and literacy were taken in this pre-test and post-test with a total of 5 indicators and a total of 42 and 5 questions respectively. Here's the recapitulation,

**Table 1. Recapitulation of Research Results**

Ability	Statistic	Blended Learning			N
		Pretest	Posttest	N-Gain	
Mathematical Literacy SMI 45	$\bar{x}$	6,16	28,77	0,59	31
	%	13,69	63,93	59	
Resilience SMI 168	$\bar{x}$	100,03	121,16	0,31	31
	%	59,54	72,12	31	

From Table 1. it can be seen that the average scores of the pretest and posttest of mathematical literacy abilities are much different. This shows that the initial and final abilities have increased by a total of 59%. Likewise, the pretest and posttest averages of mathematical resilience are quite different with a total increase of 31%. This shows that the resilience and mathematical literacy abilities of students after being given learning with the blended learning model are better than before.

## CONCLUSION

Based on the background and research results, it can be concluded that,

1. Blended learning is said to be a combination or amalgamation of various aspects including web-based learning, video streaming, audio, and communication with traditional learning systems, and also includes methods, learning theories, and pedagogic dimensions.
2. There is an increase in mathematical resilience and literacy skills using Blended Learning with a percentage of 31% and 59% respectively.

## REFERENCES

- Arends, R. (2008). *Learning to Teach*. Yogyakarta: Pustaka Belajar.
- Arianingsih, L. C., Meifiani, N. I., dan Apriyani, D. C. N. (2020). Hubungan antara Literasi Matematika dengan Kemampuan Berpikir Kreatif Matematik Siswa Kelas VIII SMP Negeri 1 Arjosari. *Respository STKIP PGRI Pacitan*.
- Asih, K. S., dkk. (2019). Resiliensi Matematis pada Pembelajaran Discovery Learning dalam Upaya Meningkatkan Komunikasi Matematika. *PRISMA, Prosiding Seminar Nasional Matematika*, PRISMA 2 (2019): 862-868.
- Bruner, J. (1977). *The Process of Education*. Harvard University Press.
- Comey, W. L. (2009). Blended Learning and the Classroom Environment: A Comparative Analysis of Students' Perception of the Classroom Environment across Community College Courses Taught in Traditional Face-to-face, Online and Blended Methods. (Disertation). The Faculty of The Graduate School of Education and Human Development of The George Washington University in partial fulfillment of the requirements for the degree of Doctor of Education.
- Creswell, J. W., & Plano, C. V. (2014). *Designing and Conducting Mixed Methods Research*. Thousand Oaks: Sage Publication.
- Darma, I. K., dkk. (2020). Blended Learning, Inovasi Strategi Pembelajaran Matematika di Era Revolusi Industri 4.0 Bagi Pendidikan Tinggi. *PRISMA, Prosiding Seminar Nasional Matematika*, PRISMA 3 (2020): 527-539.
- Discoll, M. (2002). *Blended Learning: Let's Get Beyond the Hype*.
- Draft Mathematics Framework. (2013). <https://www.oecd.org/pisa>.
- Draft Mathematics Framework 2021.
- Fathani, A. H. (2013). Gaya Belajar Siswa dalam Menyelesaikan Masalah Matematik Ditinjau dari Tingkat Kecenderungan Kecerdasan Matematik dan Linguistik. *Prosiding Seminar Nasional Matematika dan Pendidikan Matematika*, 18 Mei 2013. Malang: UIN Malang.
- Gardner, H. (1998). *Multiple Intelligences: The Theory in Practice*. New York: BasicBooks.
- Graham, C. R. (2005). *Blended Learning System. Definisi, Current, and Future Directions*. dalam *The Hand Book of Blended Learning*.
- Haughey, M. and Anderson, T. (1998). *Networked Learning. The Pedagogy of The Internet*. Montreal: Mc Graw-Hill.
- Hidayati, dkk., (2020). Literasi Matematika Calon Guru Sekolah Dasar dalam Menyelesaikan Masalah Pisa Konten Shape and Space. *Jurnal Pembelajaran Matematika Inovatif* Volume 3, No. 3, Mei 2020.

- Husamah. (2014). *Pembelajaran Bauran (Blended Learning)*. Jakarta: Prestasi Pustaka Raya.
- Hutauruk, A. J. B., dan Naibaho, T. (2020). Indikator Pembentuk Resiliensi Matematis Mahasiswa Prodi Pendidikan Matematika FKIP. *SEPREN: Journal of Mathematics Education and Applied*. Vol. 01, No.02, 78-91.
- Jasmine, J. (2007). *Professional's Guide: Teaching with Multiple Intelligences. Terjemahan oleh Purwanto (Panduan Praktis Mengajar Berbasis Multiple Intelligences)*. Bandung: Nuansa.
- Johar, R. (2012). "Domain Soal PISA untuk Literasi matematisa". *Jurnal Peluang*, Volume 1, Nomor 1, Oktober.
- Koohang, A. (2009) A Learner-Centered Model for Blended Learning Design. *International Journal of Innovation and Learning*, 6(1), 76–91.
- Krathwohl, D. R. (2002). A Revision of Bloom's Taxonomy: An Overview Theory into Practice. *Autum*. Vol.41, No.4.
- Mahdiansyah dan Rahmawati. (2014). "Literasi matematisa Siswa Jenjang Pendidikan Menengah: Analisis Menggunakan Desain Tes Internasional dengan Konteks Indonesia". *Jurnal Pendidikan dan Kebudayaan*. 20(4).
- Maryanti. (2012). *Peningkatan Literasi matematisa Peserta didik Melalui Pendekatan Metacognitive Guidance*. Bandung: Universitas Pendidikan Indonesia.
- Mufidah, N. L., & Surjanti, J. (2021). Efektivitas Model Pembelajaran Blended Learning dalam Meningkatkan Kemandirian dan Hasil Belajar Peserta Didik pada Masa Pandemi Covid-19. *Ekuitas: Jurnal Pendidikan Ekonomi*, 9(1), 187-198.
- Murni, V., dkk. (2021). Hubungan Antara Minat Belajar Dengan Resiliensi Matematis Pada Masa Pandemi COVID-19. *Jurnal Cendekia: Jurnal Pendidikan Matematika* Volume 05, No. 02, Juli 2021, pp. 1147-1158.
- Nasution, N., dkk. (2019). *Buku Model Blended Learning*. Pekanbaru: Unilak Press.
- OECD. (2010). (2009). *Matemathics Framework*. Paris: PISA, OECD Publishing.
- OECD. (2021). (2010). (2009). *Matemathics Framework*. Paris: PISA, OECD Publishing.
- OECD (2009); OECD (2010); Staecy (2011); [nces.ed.gov/timss/pdf/naep\\_timss\\_pisa\\_comp.pdf](https://nces.ed.gov/timss/pdf/naep_timss_pisa_comp.pdf).
- Peraturan Menteri Pendidikan Nasional Nomor 22 Tahun 2006 tentang Standar Isi untuk Satuan Pendidikan Dasar dan Menengah.



- Piaget, J. (1965). *The Origins of Intelligence in Children*. New York: International University Press Inc.
- Poespoprodjo, W. (2011). *Logika Ilmu Nalar*. Bandung: Pustaka Grafika.
- Ramsay. (2001). *Teaching and Learning With Information and Communication Tecnology: Succes Through a Whole School*.
- Rahmatiya, R., dan Miatun, A. (2020). Analisis Kemampuan Pemecahan Masalah Matematis Ditinjau dari Resiliensi Matematis Siswa SMP. *Teorema: Teori dan Riset Matematika*, 5(2), 187–202.
- Rifai'i, A., dan Catharina, T. A. (2009). *Psikologi Pendidikan*. Semarang: Unnes Press.
- Rusman. (2012). *Belajar dan Pembelajaran Berbasis Komputer (Mengembangkan Profesionalisme Guru Abad 21)*. Bandung. Penerbit Alfabeta.
- Sari, Rosalia Hera Novita. (2015). *Literasi matematis: Apa, Mengapa, dan Bagaimana. Seminar Nasional Matematika dan Pendidikan Matematika*. Yogyakarta: Universitas Negeri Yogyakarta.
- Setiawan, R. dkk. (2019). Efektivitas Blended Learning dalam Inovasi Pendidikan Era Industri 4.0 pada Mata Kuliah Teori Tes Klasik. *Jurnal Inovasi Teknologi Pendidikan*, Volume 6, No. 2, Oktober 2019 (148-157).
- Susilawati, dkk., (2021). Pembelajaran Terintegrasi STEM Uuntuk Meningkatkan Literasi Matematis Mahasiswa Calon Guru Matematika pada Perkuliahan Pra-Kalkulus 1. *Teorema: Teori Dan Riset Matematika*, 6(1), 82–97, Maret 2021.