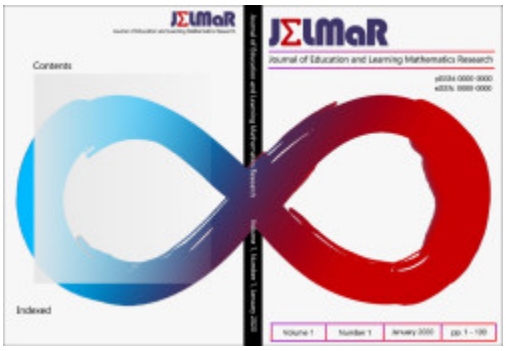

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Application of Brain Based Learning Model to Reduce Mathematics Anxiety and Improve Student Learning Outcomes

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***Abstract**: Mathematic anxiety and low student learning outcomes are problems that need special attention, especially in the field of mathematics learning. The purpose of this study is to reduce students' mathematic anxiety level and improve their learning outcomes by applying the Brain Based Learning model. This type of research uses Classroom Action Research which consists of 2 cycles, namely planning, implementation or action, observation or observation, and reflection. The data collection techniques used were interviews, questionnaires, observations, tests, and documentation. The results of this study prove a decrease in students' mathematics anxiety, where in cycle I 10 students experienced high anxiety, while in cycle II there were no students who experienced high anxiety. In addition, student learning outcomes also increased from 63.64% including the sufficient category in cycle I, then in cycle II to 87.88% with a very good category. So this research proves that using the Brain Based Learning model can reduce mathematics anxiety and improve their learning outcomes.*
Keyword: brain based learning, learning outcomes, mathematics anxiety

INTRODUCTION

Learning is an important component in education to help students improve their critical thinking and understanding. MT (2022) says that learning is defined as a comprehensive process, where there is interaction between students, teachers, and learning resources in a learning environment. Learning is used as an effort to help students learn, especially in subjects such as mathematics, which are considered difficult by some students. This is because math is a complicated, monotonous, scary lesson, and has many formulas (Wijayanti & Yanto, 2023).

So that mathematics learning needs to be designed in such a way that students are not only able to memorize formulas, but also understand how these formulas are applied in real life, especially for students at Vocational High Schools. Students often feel that math is not in line with the needs they learn in Vocational High Schools. This can affect students' mindset, even making them avoid math lessons. So students experience feelings of fear, discomfort, tension, worry, and anxiety when facing math. All of these symptoms are a form of math anxiety, which hinders the learning process.

According to Wuisan et al. (2024) mathematics anxiety has a direct impact on student learning achievement. Mathematics anxiety makes it difficult for students to focus and process the information they learn (Laily & Lestari, 2024). Their inability to understand the material well will affect low learning outcomes. Not only that, mathematics anxiety also has an impact on student motivation. Low motivation can be one of the factors that cause difficulties in understanding and mastering mathematical concepts (Hasyim & Abadi, 2023).

Based on the results of unstructured interviews with mathematics teachers, it shows that there are still many students who are uncomfortable learning math, sleepy in class, not confident when doing math problems in front of the class, feel bored, and want to change subjects immediately. In addition, student learning outcomes are also low, out of a total of 33 students, only 11 students have reached the Minimum Mastery Criteria (MMC) score, while 22 students have not reached the MMC. This indicates difficulty in understanding

the material, especially concepts that require analysis. As a result, students cannot do application problems related to the system of linear equations. To overcome this problem, a learning that can attract students' interest in learning mathematics is needed. Interesting and fun learning can help overcome anxiety and student learning outcomes. One of the learning models that can be used is the Brain Based Learning model.

Brain Based Learning is a learning model that is synchronized with the natural workings of the brain when learning (Permana & Sulastri, 2020). This model is designed to make the learning process more comfortable and enjoyable. The learning is done in an interesting way, such as using games, group activities, providing breaks between lessons, and other activities that are tailored to the needs of students. In relation to mathematics anxiety, research conducted by Fikriyah et al. (2021) tried to apply the Brain Based Learning model and the results stated that the Brain Based Learning model contributed to reducing mathematics anxiety in students.

This is because Brain Based Learning is designed to optimize the way the brain works during the learning process with fun methods, such as being given quizzes, games that sharpen the brain, and brain exercises, both individually and in groups. Fun activities can help students feel more comfortable while learning. The application of this model is not only able to help students in reducing the mathematics anxiety they feel, but also able to increase student motivation, especially at the Vocational High School level because as research conducted by Zanabazar (2023) that learning motivation can reduce mathematics anxiety and student learning outcomes increase.

When students are motivated, they are more confident, willing to try, and less worried about making mistakes. Motivation also provides positive energy, which encourages them to be more active in finding fun ways to learn, such as discussing with friends or using additional learning resources. So that students easily understand the material, especially on the material of the system of linear equations. A system of linear equations is a collection of several interconnected linear equations (Susanto, 2021). In this material, students are asked to find variable values that fulfill all the equations in this material. Most vocational students find this material difficult because they have difficulty understanding the basic concepts and its application in everyday life. Therefore, it is important to design learning that is fun and suitable for students' needs.

METHOD

This type of research uses Classroom Action Research. Researchers used a model from Kemmis and Mc Taggart, which consists of 4 stages, namely planning, implementation or action, observation or observation, and reflection (Arikunto, 2021). The subjects in this study were students of class X AKL 4 with the subject selection technique using purposive sampling technique. Furthermore, the data collection techniques used were interviews, questionnaires, observations, tests, and documentation. Data analysis used in this study includes analyzing questionnaire data, observation sheets, and student learning outcomes.

Questionnaires were given to all students of class X AKL 4 to measure students' mathematics anxiety at the end of each cycle. To determine the level of students' mathematics anxiety, the average value ($\bar{x}$) and Standard Deviation (SD) of the overall questionnaire score were calculated. Then conclusions were drawn related to the level of mathematics anxiety. The criteria for the level of mathematics anxiety used are listed in table 1.

Table 1. Mathematics Anxiety Level Criteria

No.	Score Interval	Criteria
1	$x < \bar{x} - 1.SD$	Low
2	$\bar{x} - 1.SD \leq x < \bar{x} + 1.SD$	Medium
3	$\bar{x} + 1.SD \leq x$	High

(Sholichah & Aini, 2022)

Furthermore, the observation sheet is used to identify teacher activities during the learning process. The following is the formula for calculating the percentage of success of the learning process.

$$P = \frac{\sum acquisition\ score}{\sum score\ total} \times 100\%$$

Keterangan:
P = Succes rate

Then to determine the success of student learning with the minimum criteria of MMC ≥ 70. Analysis of student learning outcomes test data is used to measure student understanding and ability. The percentage of learning success can be calculated using the following formula.

$$P = \frac{\sum s}{N} \times 100\%$$

Description:
P = Percentage of success
$\sum s$ = Number of students who scored ≥ 70
N = Number of all students

In table 2 below there are criteria to determine the success of student learning and the learning process.

Table 2. Criteria for Student Learning Success and Learning Process

Student Learning Succes	Criteria
80% – 100%	Excellent
66% – 79%	Good
56% – 65%	Sufficient
40% – 55%	Less
≤ 40%	Very Less

(Wahyudi et al., 2021)

RESULT AND DISCUSSION

In this Classroom Action Research activity, it consists of planning, implementation, observation or observation, and reflection. Planning activities, researchers prepared teaching modules, formative assessments in the form of Learner Worksheets and summative assessments in the form of learning outcomes tests, mathematics anxiety questionnaire sheets, observation sheets, mathematics teaching materials, and PowerPoint for linear equation system material. In the implementation activity, the researcher acts as a teacher in the classroom to carry out learning. Learning was carried out using the Brain Based Learning model.

In cycle I, although there were challenges such as lack of student focus and discomfort during presentations, students began to show adjustments to this learning model. Then in cycle II, there was an increase in students' activeness and courage to participate. During the test, they showed a higher level of independence and could do the task better. The questionnaire results from cycle I and II are shown in table 3 below.

Table 3. Mathematics Anxiety Questionnaire Results Cycle I and Cycle II

Criteria	Number of Student	
	Cycle I	Cycle II
Low	3	17
Medium	20	16
High	10	0
Number of Student	33	33

The table above shows that in cycle II there was a decrease in the level of mathematics anxiety, especially in students who had high anxiety from 10 students to no students who experienced high anxiety. In addition, the number of students with low anxiety increased from 3 students to 17 students, while students with moderate anxiety experienced a slight decrease from 20 students to 16 students. As for student learning outcomes, they are listed in table 4 below.

Table 4. Comparison of Student Learning Outcomes Cycle I and Cycle II

Student Learning Outcomes	Percentages	
	Cycle I	Cycle II
Score ≤ 70	36.36%	12.12%
Score ≥ 70	63.64%	87.88%

Based on the table above, it is known that student learning outcomes in cycle I and cycle II have increased. In cycle I, the success of student learning was 63.64% with the number of students who scored ≥ 70 as many as 21 students out of 33 students, this shows that learning in cycle I is said to have not yet reached the success indicator with sufficient criteria. Whereas in cycle II the success of student learning was 87.88% with the number of students scoring a score ≥ 70 as many as 29 students out of 33 students, so that learning in cycle II had achieved success indicators with excellent criteria.

Based on the research results obtained, the application of the Brain Based Learning model succeeded in reducing mathematics anxiety and improving student learning outcomes. The results of this study are proven by research conducted by Fikriyah, et al. (2021) which revealed that the application of the Brain Based Learning model can significantly reduce students' math anxiety. Furthermore, research by Profithasari, et al. (2024) stated that the application of the Brain Based Learning model can increase student activeness in class and improve student learning outcomes. This is because the Brain Based Learning model is an interactive learning model, making students more active, and the classroom atmosphere becomes fun.

CONCLUSION

Research that applies the Brain Based Learning model can reduce students' mathematics anxiety. This can be seen from the questionnaire results obtained showing that students experienced a decrease in anxiety levels from 10 students who experienced high anxiety, to no students who experienced high anxiety. In addition, this model can also improve student learning outcomes. It can be seen that the number of students who met the MMC score increased, from 63.64% (sufficient) to 87.88% (excellent).

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REFERENCES

Arikunto, S. (2021). *Penelitian Tindakan Kelas: Edisi Revisi*. Jakarta: Bumi Aksara.

Fikriyah, D. S., Maharani, G., Nugraha, M. G. A., & Mubarika, M. P. (2021). Meningkatkan Kemampuan Pemahaman Serta Menurunkan Kecemasan Matematis Melalui Strategi *Brain Based Learning*. *JUMLAHKU: Jurnal Matematika Ilmiah STKIP Muhammadiyah Kuningan*, *7*(2), 64–78.

Hasyim, P. H. & Abadi, A. P. (2023). Pengaruh Motivasi Belajar terhadap Kemampuan Pemahaman Matematis Siswa. *MATH LOCUS: Jurnal Riset Dan Inovasi Pendidikan Matematika*, *06*(01), 4877–4883. https://doi.org/10.31002/mathlocus.v4i2.4238.

Laily, N. & Lestari, A. S. B. (2024). Studi Literatur : Analisis Pembelajaran Matematika Kecemasan Siswa pada Pembelajaran Matematika. *Ar- Riyadhiyyat: Jurnal Pendidikan Matematika*, *4*(2), 81–89.

Permana, F. B., & Sulastri, A. (2020). Pendekatan *Brain-Based Learning* sebagai Model Pembelajaran di Sekolah Dasar. *Jurnal Basicedu*, *8*(4), 3322–3330. https://doi.org/10.31004/basicedu.v8i4.8544.

Profithasari, N., Lutfiani, U. I., & Rapani. (2024). Efektivitas *Brain Based Learning* Berbantuan *Wordwall* terhadap Kemampuan Berpikir Kritis Peserta Didik. *Jurnal Studi Guru dan Pembelajaran*, *7*(1), 399–408. https://doi.org/https://doi.org/10.30605/jsgp.7.1.2024.3841.

Sholichah, F. M. & Aini, A. N. (2022). *Math Anxiety* Siswa: Level Dan Aspek Kecemasan. *Journal of Mathematics Learning Innovation (JMLI)*, *1*(2), 125–134.

Susanto, Ahmad. (2018). *Bimbingan dan Konseling di Sekolah: Konsep, Teori, dan Aplikasinya*. Jakarta: Prenadamedia Group.

Wahyudi, H., Irawati, T. N., & Siskawati, F. S. (2021). Penerapan Model Pembelajaran TAI Berbasis PBI untuk Meningkatkan Aktivitas dan Hasil Belajar Matematika. *AXIOMA: Jurnal Matematika dan Pembelajaran*, *6*(2), 78–86.

MT, A. M. (2022). Peningkatan Kualitas Mahasiswa Pendidikan Matematika Melalui Pelatihan Pemanfaatan Mobile dalam Pembelajaran Matematika. *Al-Khidmah Jurnal Pengabdian Masyarakat*, *2*(1), 41–48. https://doi.org/10.56013/jak.v2i1.1423.

Wijayanti, A. & Yanto, A. (2023). Pembelajaran Matematika Menyenangkan di SD Melalui Permainan. *Polinomial : Jurnal Pendidikan Matematika*, *2*(1), 18–23. https://doi.org/10.56916/jp.v2i1.316.

Wuisan, S., Tuerah, P. E. A., & Tilaar, A. L. F. (2024). Analisis Tingkat *Mathematics Anxiety* dan Tingkat *Self-Efficacy* terhadap Prestasi Belajar Matematika Siswa SMP. *4*(1), 554–564. https://doi.org/10.51574/kognitif.v4il.1662.

Zanabazar, A., Deleg, A., Ravdan, M., & Tsogt-Erdene, E. (2023). The Relationship Between Mathematics Anxiety and Mathematical Performance Among Undergraduate Students. *Jurnal Ilmiah Peuradeun*, *11*(1), 309–322. https://doi.org/10.26811/peuradeun.v11i1.780.