The Effect Of The Snowball Throwing Learning Model On Students' Motivation And Learning Outcomes

Pinta Romaito Br Sagala[1*], Lily Rohanita Hasibuan[2]

[1] Teaching and Education Faculty, Mathematics Education Study Program, Universitas Labuhanbatu, Sumatera Utara, Indonesia
Email: [1*]pintasagala12@gmail.com, [2]lyrohanita@gmail.com

Abstract

This study aims to determine: 1) the effect of the *snowball throwing* learning model on the learning motivation of students; 2) the effect of the *snowball throwing* learning model on the learning outcomes of students; 3) the effect of the *snowball throwing* learning model on the motivation and learning outcomes of students. This study uses a quantitative approach with pseduo experimental design. Sampling was carried out using *random sampling* technique, namely class X-2 totaling 28 students as a control class with the application of conventional learning models and class X-1 totaling 28 students as an experimental class with the application of the *Snowball Throwing* learning model. Based on the Manova-Test results, the F value for learning motivation is 8.751; $p < 0.05$; and the F value of learning outcomes is 5.219; $p < 0.05$ while in multivariate motivation and learning outcomes obtained is the F value of 5.204; $p < 0.05$. That's the F values are all significant. So it can be concluded that there is an influence of the *Snowball Throwing* learning model on student motivation and learning outcomes.

Keywords: *Snowball Trowing, Learning Motivation, Learning Outcomes*

1. INTRODUCTION

Learning is a process of interaction between educators and students in a learning environment designed to help students realize their potential. Mathematics is a crucial topic that must be taught at all educational levels. In line with the content requirements for Elementary and Secondary Education units, mathematics must be taught to all students in order to equip them with the ability to think rationally, analytically, methodically, critically, and creatively, as well as to collaborate (Abror, M., 2022). Mathematics is taught through engaging and purposeful activities so that students may attain their learning objectives effectively (Nurhasanah, 2022). One of the duties of the teacher in the learning process is as a motivator who may encourage or inspire students to learn (Sundari, 2017). This role is crucial to the learning process in order to enhance student motivation and learning activity development.

Motivation is one of the variables that determine an individual's success in reaching their objectives (Fadhilah et al., 2019). Besides, Cole and Chan (Dagnew, 2018) also stated that Motivation is human energy aimed toward accomplishing a certain objective. A person's personal energy can alter based on internal and external influences, and the appearance of this energy is determined by emotions and responses to objectives. Consequently, if it is concluded from the preceding opinion that learning motivation is a business process that encourages children to be able to achieve a goal in learning, then students tend to engage in learning activities that are motivated by the desire to achieve the highest possible achievement or learning outcomes. Student learning outcomes are the abilities acquired by students as a result of participating in learning activities, which are quantified results of post-learning evaluations. Student learning results will be affected by their learning motivation (Muflihah, 2021). This implies that students with motivation and those without motivation will have qualitatively and quantitatively distinct learning results. In a larger sense, learning outcomes are alterations in behavior caused by learning in the cognitive, emotional, and psychomotor domains (Mansur, 2018).

Based on the results of observations made in class X (Phase E) SMA Negeri 1 Merbau, that students have low motivation and learning outcomes in exponential material mathematics. During the learning process, some students were passive and less enthusiastic about learning, such as not wanting to ask questions about difficult material and remaining silent, so that the learning conducted was ineffective. Furthermore, when given assignments, some students lacked independence in completing them. This indicates that many students lack desire or excitement for learning, and that many do not comprehend the content presented by the teacher during the session, resulting in low scores on daily mathematics tests for many students. The inaccuracy of the model employed by the teacher to educate is responsible for the low learning motivation and outcomes of the students. This is due to the fact that when learning occurs, the teacher solely employs a traditional learning model, meaning the lecture and assignment technique, without ever interspersing interesting ways and challenging students' way of thinking to encourage them to be active participants in the learning process.

To solve the mentioned issues, creative learning models must be implemented by teachers during the mathematics learning process. It is consistent with the opinion (Yusri et al., 2018) which stated that a diverse learning model might be utilized by teachers to combat low levels of learning motivation. The Snowball Throwing learning model is regarded capable of generating an active, productive, creative, and enjoyable learning environment. The learning paradigm of Snowball Throwing is a cooperative learning model. In this learning methodology, students are divided into groups and then create questions based on previously taught content on a roller piece of paper, which is then tossed to other students, and the student who catches the ball answers the questions contained therein (Kusumawati, 2017). The last phase of the snowball thrown learning model is to produce learning reports and then collect them to monitor the growth of students' knowledge, skills, and attitudes towards a subject (Julyanti, 2019). It can be stated that learning snowball throwing is training students to listen to other people's opinions, training students' creativity and imagination in making questions, and encouraging students to work together, help each other and be active in learning. The snowball learning approach can boost student motivation and learning results. This is in accordance with previous research conducted by (Ratnasari, M., 2019) which stated that There is a relationship between the snowball throwing learning model and student motivation and learning results, and by employing this approach, student motivation and learning outcomes will grow.

By using the snowball throwing learning model, learning will be fun and meaningful so that students can achieve learning objectives in exponential material according to the curriculum used in class X (Phase E), namely the independence curriculum. The independence curriculum is a new policy program of the Ministry of Education and Culture of the Republic of Indonesia (Kemendikbud RI) which was proclaimed by the Minister of Education and Culture of the Republic of Indonesia Advanced Cabinet, The essence of freedom of thought, according to Nadiem, must be preceded by teachers before they teach it to students. The nuances of learning in this curriculum will be more comfortable, because students will be able to discuss more with the teacher, learn by not only listening to the teacher's explanation, but rather form the character of students who are courageous, independent, smart in socializing, civilized, polite, competent, and not relying solely on a ranking system, which, according to a number of surveys, only worries children and parents, because in reality every child has talent and intelligence in some areas (Di et al,, 2020). With the independence curriculum, it is expected that students can grow in accordance with their potential and ability, as they get active, high-quality, expressive, applicable, varied, and progressive learning (Rahayu, R., 2021). Based on the description of the background above, the writer is interested in conducting research with the title "The Effects of The Snowball Throwing Learning Model on Students' Motivation and Learning Outcomes ".

2. METHOD

2.1 Basic Research Framework

Based on the problems studied, the approach used in this research is a quantitative approach, because this research is presented with numbers. Quantitative research aims to make a comparison of the effects of a particular treatment with another different treatment or with no treatment, so there are two comparison groups. That is, with the experimental group and the control group, the control group and the experimental group should be as close to the same characteristics as possible. The results of the two groups will be compared statistically. The approach used in this research is a quantitative approach with quasi-experimental research methods. This design has two groups, the first group with the Snowball Throwing learning model is used as the experimental class, while the second class uses conventional learning methods as the control class. At the end of the teaching and learning process, the two groups were measured using the same measurement tool, namely the post test to measure student learning outcomes and a questionnaire to determine the level of student motivation.

The variables in this study consist of independent variables and dependent variables. The independent variable in this study is the *Snowball Throwing* learning model (X) and the dependent variable in this study is student learning motivation (Y1) and student learning outcomes (Y2). The population in this study were all students of class X (Phase E) Merbau 1 Public High School consisting of 210 students using the independent curriculum in the 2022/2023 academic year. The sampling technique was carried out using a random sampling technique, namely class X-2 totaling 28 students as the control class and class X-1 totaling 28 students as the experimental class. The number of respondents based on gender can be seen in table 1. below:

Table 1. Research Respondents Based on Gender

Gender	Amount (student)	Percentage
Male	12	42,9%
Female	16	57,1%
Total	28	100%

The design model used in this study is the pretest posttest control group design model, where the two sample classes are given different treatments. The research design used is described in the following table:

Table 2. Pretest Posttest Control Group Design

Class	Pre-test	Treatment	Pos-test
Experiment	X_1	Snowball Throwing	X_2
Control	X_1	Conventional	X_2

Information :
X_1 : Ability test before being given the snowball throwing learning model
X_2 : Ability test after being given the snowball throwing learning model

The research instruments used in this study were tests and questionnaires. The research data was collected using a test instrument in the form of an essay totaling 10 questions consisting of 5 pre-test questions and 5 post-test questions which were used to measure student learning outcomes and a questionnaire in the form of a questionnaire containing 30 questions was used to measure student learning motivation. Essay test sheets and questionnaires have passed the validation stage by experts and have been tested for validity and reliability. Furthermore, the data analysis technique in this study is descriptive analysis which includes normality tests, homogeneity and hypothesis testing, namely the manova test with the help of SPSS version 25.

3. RESULT AND ANALYSIS

Based on the research results obtained, the pre-test and post-test values showed an increase in student learning outcomes and the results of the questionnaire showed an increase in student learning motivation. The results of the descriptive analysis of the pre-test and post-test data from learning outcomes and the learning motivation questionnaire can be seen in table 3 below:

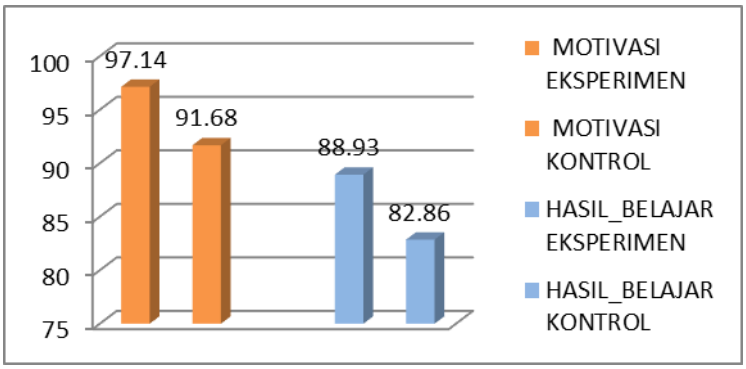
Table 3. Statistical Descriptive Results Data

Descriptive Statistics

MOTIVATION	EXPERIMENT	97.14	7.764	28
	CONTROL	91.68	5.938	28
	Total	94.41	7.382	56
LEARNING_OUTCOMES	EXPERIMENT	88.93	9.063	28
	CONTROL	82.86	10.752	28
	Total	85.89	10.318	56

Based on table 3 above, the results of calculating the hypothesis test on the motivation and learning outcomes of students in class X-1 as an experimental class with the treatment of the snowball throwing learning model as many as 28 students have an average learning motivation of 97.14 with good and average categories learning outcomes 88.93 with good category. While class X-2 as the control class with conventional learning model treatment of 28 students has an average learning motivation of 91.68 in the good category and an average learning outcome of 82.86 in the good category. The post-test scores of learning outcomes and questionnaires of learning motivation, the average obtained by the experimental class is higher than the control class. It has been presented in Figure 1 below :

Figure 1. The average value of the post-test and questionnaire



Based on Figure 1. above, it can be seen that the average value of the posttest of the experimental class is 88.93 and in the control class is 82.86 . While the average value of the questionnaire of learning motivation of the experimental class is 97.14 and in the control class is 91.68 . So it can be concluded that the motivation and learning outcomes of students given the *Snowball Throwing* learning model are better than students given conventional learning.

3.1 NORMALITY TEST

Table 4. Post Test Normality Test Data
One Sample Kolmogorov-Smirnov Test

		EXPERIMENT	CONTROL
N		28	28
Normal Parameters[a]	Mean	88.93	82.86
	Std. Deviation	9.063	10.752
Most Extreme Differences	Absolute	.190	.186
	Postive	.111	.129
	Negative	-.190	-.186
Kolmogorov-Smirnov Z		1.005	.985
Asymp. Sig. (2-tailed)		.265	.287

a. Test distribution is Normal.

Based on table 4 above, the Asymp.Sig.(2-tailed) value was obtained in the experimental class with the snowball throwing learning model treatment of 0.265 and in the control class with the conventional learning model treatment of 0.287 so that from 0.05. So it can be concluded that the post test data is normally distributed.

Table 5. Data on Motivational Questionnaire Normality Test Results
One Sample Kolmogorov-Smirnov Test

		EXPERIMENT	CONTROL
N		28	28
Normal	Mean	97.14	91.68
	Std. Deviation	7.764	5.938
Most Extreme Differences	Absolute	.120	.114
	Postive	.083	.114
	Negative	-.120	-.112
Kolmogorov-Smirnov Z		.635	.601
Asymp. Sig. (2-tailed)		.814	.862

a.Test distribution is Normal.

Based on table 5 above, the Asymp.Sig.(2-tailed) value was obtained in the experimental class with the snowball throwing learning model treatment of 0.814 and in the control class with the conventional learning model treatment of 0.862 so that > from 0.05. So it can be concluded that the questionnaire data is declared normally distributed.

3.2 HOMOGENITY TEST

The variance homogeneity test is used to test whether the data has a homogeneous variant or not on the variables of motivation and student learning outcomes with a significance level of 0.05 (5%). It is said that all variables have a homogeneous variant if the sig. > 0.05. The homogeneity test of variance can be seen from the Levene's test results in the table below:

Table 5. Variant Homogeneity Test Data

Levene's Test of Equality of Error Variances[a]

	F	df1	df2	Sig.
MOTIVATION	2.290	1	54	.136
LEARNING_OUTCOMES	.568	1	54	.454

Tests the hypotesis that the error variance of the depedent variable is equal across groups.

Based on table 5. above, it is known that the results of the motivational questionnaire have Sig. 0.136 (Sig. 0.136 > 0.05) and the post test scores for learning outcomes have Sig. 0.454 (Sig. 0.454 > 0.05). Because both of them obtained a value of Sig. ≥ 0.05, meaning that the motivational questionnaire scores and post-test scores for learning outcomes have a homogeneous variant. Thus, the MANOVA hypothesis test can be continued.

3.3 MANOVA TEST

3.3.1 The effect of the Snowball Throwing learning model on the motivation to learn mathematics in class X SMA Negeri 1 Merbau.

For testing the first hypothesis to see whether there is an effect of *Snowball Throwing* learning on learning motivation. So, it can be seen from the Test of Between-Subjects Effect table in table 4 below.

Table 6. Data Subjects Effects with MANOVA Test

Tests Of Between-Subject Effects

Source	Dependent Variable	F	Sig.
CLASS	MOTIVATION	8.751	0.005
	LEARNING_OUTCOMES	5.219	0.026

From table 6. above, it can be seen that the experimental class was given the *snowball throwing* learning model treatment and the control class was given the conventional learning model treatment with learning motivation values having a relationship with an F value of 8.751 and has a Sig. 0.005 <0.05. So it can be concluded that there is an influence of the Snowball Throwing learning model on the motivation to learn mathematics in class X SMA Negeri 1 Merbau. The Snowball Throwing learning model will create a fun atmosphere fun in the learning process and arousing student motivation in study. Students will more easily understand basic concepts and ideas more and better by sharing knowledge information. The Snowball Throwing learning model helps children learn to follow rules, making questions, waiting their turn, answering questions, and learn to fit in a group. In the learning phase Snowball Throwing is implicitly one of them train students' readiness to respond and solve internal problems understand the subject matter. Solving problems, both group problemsor individuals will be able to increase understanding and learning achievement while increasing student motivation. Another phase is in the form Appreciation in the form of praise or gifts can further add to the passion learning and motivating students to get the best results. Thus the Snowball Throwing learning model model make students active, feel happy and work together to solve problems can be solved easily and correctly. In Snowball Throwing students develop their knowledge through their actions explaining the material to friends who do not understand. Meanwhile for students who have not understand the material can be more familiar with the explanation conveyed by friends peers. So that each of the individuals benefit from this group learning.

3.3.2 The effect of the Snowball Throwing learning model on the mathematics learning outcomes of class X students of SMA Negeri 1 Merbau.

For testing the second hypothesis, see if there is an effect of *Snowball Throwing* learning on learning outcomes. The results of the second hypothesis test can be seen from the *Test of Between-Subjects Effect* table in table 6. above in the first hypothesis test. From the Test of Between-Subjects Effect table above, it shows that the relationship between the experimental class and the control class is known to have a test value with an F value of 5.219 and has a Sig.0.026 level <0.05. So it can be concluded that there is an influence of the Snowball Throwing learning model on the mathematics learning outcomes of class X students of SMA Negeri 1 Merbau. From the description above, it can be seen that the use of the model Snowball Throwing learning has a positive influence on learning outcomes student. In addition, the results of the study show that learning mathematics which uses the Snowball Throwing learning model better

compared to those using conventional learning.

3.3.3 The effect of the Snowball Throwing learning model on the motivation and results of learning mathematics in class X SMA Negeri 1 Merbau.

To determine the effect of the *Snowball Throwing* learning model on motivation and learning outcomes, an analysis of Pilae Trace, Wilk Lambda, Hotelling Trace, Roy's Largest Root is used. The results of the analysis are presented in table 7 below:

Table 7. Multivariate Test Results Data with the MANOVA Test,

Source	Dependent Variable	F	Sig.
CLASS	Pillai's Trace	5.204	0.009
	Wilks' Lambda	5.204	0.009
	Hotelling's Trace	5.204	0.009
	Roy's Largest Root	5.204	0.009

Based on table 7. above, the results of the multivariate analysis show that the F values for *Pillai's Trace, Wilks' Lambda, Hotelling's Trace, Roy's Largest Root*, have sig. 0.009, so 0.009 < 0.05. That is, the F values for *Pillai's Trace, Wilks' Lambda, Hotelling's Trace, Roy's Largest Root* are all significant. So it can be concluded that there is an influence of the *Snowball Throwing* learning model on student motivation and learning outcomes significantly in the exponential material of the independent curriculum in class X or phase E of SMA Negeri 1 Merbau. According to the results of the above data analysis, the implementation of the *Snowball Throwing* learning model has a substantial univariate and multivariate effect on student motivation and learning outcomes. In the learning process, motivation can be said as a whole the driving force within students that gives rise to learning activities, that is ensure the continuity of learning activities and provide direction to activities learning, so that the objectives desired by the subject of study can be achieved. If students have high learning motivation, then the whole process learning will be well followed starting from curiosity, deep intensity pay attention to the explanation of the lesson, read the material to the search the most appropriate strategy to achieve high academic achievement for him. Learning outcomes are abilities that individuals acquire after the learning process takes place, which can provide changes in good behavior knowledge, understanding, attitudes and skills of students so that they become more better than before.In Snowball Throwing learning emphasized in the group learning process, by paying attention to the student learning process, we can find out the learning outcomes achieved as well motivation for the lessons taught directly.

Therefore, it can be stated that the snowball learning method is more effective than the conventional learning model for increasing students' motivation and mathematical learning results in exponential content while employing an autonomous learning curriculum, namely the independent curriculum. Several relevant prior research indicate that the snowball-throwing learning model is superior than the standard learning model in terms of boosting students' motivation and learning results in mathematics. The results of the study (Ratnasari, M., 2019) revealed that the experimental class was treated with the snowball learning model, resulting in post-test results of 79.46%, whereas the control class was treated with conventional learning

models, resulting in post-test results of 68.09%, indicating that there were differences in the influence of the snowball learning model. Using the 2013 curriculum, throw on students' motivation and learning results in mathematics learning. Based on the findings of this study and earlier research, it can be stated that, despite a change in curriculum, the Snowball-throwing learning paradigm is still beneficial for mathematics learning utilizing the 2013 curriculum and the independent curriculum.

4. CONCLUSION

Based on the results of data analysis and discussion above, the following conclusions can be obtained: (1)There is an effect of the *Snowball Throwing* learning model on the motivation to learn mathematics in class X of SMA Negeri 1 Merbau on exponential material using the independent curriculum. This is based on the calculation of the MANOVA test for learning motivation F of 8.751 and has a Sig. 0.005 <0.05. (2) There is a Snowball Throwing learning model for the mathematics learning outcomes of class X of SMA Negeri 1 Merbau on exponential material using the independence curriculum. This is based on the calculation of the MANOVA test for an F learning result of 5.219 and has a Sig.0.026 level <0.05. (3) There is a *Snowball Throwing* learning model for the motivation and learning outcomes of students in class X of SMA Negeri 1 Merbau on exponential material using the independence curriculum. This is based on the calculation of the MANOVA test, for the *Snowball Throwing* learning model on students' motivation and mathematics learning outcomes obtained Sig. 0.009. Thus *Snowball Throwing* learning model is effectively used for increasing students' motivation and mathematical learning results in exponential content accordance with the independent curriculums.

REFERENCES

Abror, M. H. (2022). Self-Regulated Learning Terhadap Hasil Belajar Matematika Siswa. *Plusminus: Jurnal Pendidikan Matematika*, *2*(2), 233–242. https://doi.org/10.31980/plusminus.v2i2.1676

Dagnew, A. (2018). The Relationship Among Parenting Styles, Academic Self-Concept, Academic Motivation and Students' Academic Achievement in Fasilo Secondary School, Bahir Dar, Ethiopia. *Research in Pedagogy*, *8*(2), 98–110. https://doi.org/10.17810/2015.76

Di, T., & Pandemi, M. (2020). *Prosiding Webinar Magister Pendidikan Dasar Pascasarjana Universitas Negeri Gorontalo " Pengembangan Profesionalisme Guru Melalui Penulisan Karya Ilmiah Menuju Anak Merdeka Belajar " Gorontalo, 14 Juli 2020 ISBN: xxxxxxxxxxx*. 68–74.

Fadhilah, T. N., Handayani, D. E., & Rofian, R. (2019). Analisis Pola Asuh Orang Tua Terhadap Motivasi Belajar Siswa. *Jurnal Pedagogi Dan Pembelajaran*, *2*(2), 249. https://doi.org/10.23887/jp2.v2i2.17916

Julyanti, E. V. A. (2019). Penerapan Model Pembelajaran Snowball Throwing Untuk Meningkatkan Hasil Belajar Ipa Siswa kelas VII SMP Budi Utomo. *Jurnal Pembelajaran Dan Matematika Sigma* of. *5*(2), 43–46.

Kusumawati, N. (2017). Pengaruh Model Pembelajaran Kooperatif dengan Snowball Throwing Terhadap Hasil Belajar IPA Pada Siswa Kelas IV SDN Bondrang Kecamatan Sawoo Kabupaten Ponorogo. *Ibriez : Jurnal Kependidikan Dasar Islam Berbasis Sains*, *2*(1), 1–12. https://doi.org/10.21154/ibriez.v2i1.19

Mansur, R. (2018). Belajar Jalan Perubahan Menuju Kemajuan. *Jurnal Vicratina*, *3*(1), 145–158. http://www.riset.unisma.ac.id/index.php/fai/article/view/1075

Muflihah, *A. (2021).* MENINGKATKAN MOTIVASI DAN HASIL BELAJAR SISWA MELALUI MODEL PEMBELAJARAN INDEX CARD MATCH PADA PELAJARAN MATEMATIKA*. Jurnal Pendidikan Indonesia*. *2*(1), 152–160.

Nurhasanah, W. F., & Puspitasari, N. (2022). Studi Etnomatematika Rumah Adat Kampung Pulo Desa Cangkuang Kabupaten Garut. *Plusminus: Jurnal Pendidikan Matematika*, *2*(1), 27–38. https://doi.org/10.31980/plusminus.v2i1.1587

Restu Rahayu, Rita Rosita, Yayu Sri Rahayuningsih, Herry Hernawan, P. (2021). Jurnal basicedu. *Jurnal Basicedu*, *5*(4), 2541–2549. https://doi.org/10.31004/basicedu.v5i4.1230

Ratnasari, M., Lexbin, M. (2019). Pengaruh tipe pembelajaran Snowball Throwing terhadap Hasil Belajar Matematika Siswa. *Jurnal Pembelajaran Matematika Inovatif*,*1*(1),80–95. https://doi.org/10.32585/jdb.v1i1.110

Sundari, F. (2017). Peran Guru Sebagai Pembelajar dalam Memotivasi Peserta Didik Usia SD. *Prosiding Diskusi Panel Pendidikan*, *April*, 60–76.

Yusri, Y., Rosida, A., Jufri, J., & R, M. (2018). Efektivitas Penggunaan Media Youtube Berbasis Various Approaches Dalam Meningkatkan Motivasi Belajar Bahasa Inggris. *Eralingua: Jurnal Pendidikan Bahasa Asing Dan Sastra*, *2*(2), 77–82. https://doi.org/10.26858/eralingua.v2i2.6760