



# Analysis of Joyful Learning to A Growth Mindset in Learning Mathematics

Mudrikah Mudrikah<sup>1</sup>, Sekar Agustiningsih<sup>1</sup>, Lamiyya Shubah<sup>1</sup>, Rino Richardo<sup>4\*</sup>

<sup>1</sup> Universitas Alma Ata, Yogyakarta, Indonesia  
rinorichardo@almaata.ac.id

**Abstract.** The development of education is influenced by the quality of the generation of education itself. Learning activities are very influential on the success of the material presented, especially in learning mathematics. Some cases found that students lose motivation to learn and have a bad mindset towards math and think that math is difficult. The influence of mindset is very important for effective lifelong learning so it is necessary to develop a good mindset to support the success of students in understanding the concepts and materials presented. Math mindset is an approach to learning mathematics that believes that mindset is more important than initial ability in determining the progress of learners' understanding. Students with a growth mindset are more willing to learn new things, take risks, and accept challenges. Students with a fixed mindset have limiting beliefs about their abilities, and will attribute success in learning to factors beyond their control. Learning activities that are perceived to be less effective have an effect on fostering a growth mindset. Effective learning activities are influenced by the methods used in learning mathematics. The joyful learning method supports the concept of fun learning by using the game method (game) can provide a fun and exciting learning nuance and can help reduce students' fear and boredom of math lessons which are often considered as boring and saturating things in learning math. The purpose of this study is to determine the success of joyful learning in fostering a growth mindset in learning mathematics with a literature review approach. The results of the study show that the joyful learning method helps students understand the concept of the material presented so that the growth mindset in mathematics develops well. This research uses a qualitative method using literature review and correlational design. The instrument data collection technique used relevant journal synthesis..

**Keywords:** growth mindset, joyful learning, mathematics learning.

## 1 Introduction

The development of science and technology is increasingly driving phenomenal changes in the world of education. Education is required to be the foundation for advancing a nation. The effectiveness of structured education is influenced by its learning activities. The mindset of students in education greatly affects learning performance [1]. The development of this mindset includes the attitudes, beliefs, and expectations

held about a particular object in the learning process. Changes in students' mindset can be influenced by academic experiences, peers, and formal learning [2]. In addition, student performance is also influenced by students' mindset in learning [3]. Mindset is a belief that a person has about how possible their abilities can be changed or improved [1]. A growing mindset affects the mindset of students, but it is still common to find that the growth mindset of students is still low. Many students have a mindset that they are not confident in their abilities. This is because they believe that ability and intelligence are fixed and there is not much that can be done to change this [5].

Based on the results of a survey conducted by one of the Mathematics Teachers, the Quintessence states that the wrong perception of most students towards mathematics so far is actually the cause and effect of a treatment of mathematics teachers who do not want to change the paradigm of teaching fun mathematics and even learning mathematics which has become a scary atmosphere for most students when the next day there is a math schedule. Finally, that atmosphere is what creates the perception of students being afraid, stressed and even skipping school. In this analysis, fun learning is needed with the right learning method. The National Council of Teachers of Mathematics states that mathematics learning should be done in an effort to develop problem solving, reasoning and proof, mathematical connections, mathematical communication, and representation skills.

The effectiveness of structured education is influenced by its learning activities. Good learning activities are significantly influenced by learning methods that support achieving these learning objectives. In the implementation of teaching and learning activities, not all students are able to follow the learning well so that the learning results are not satisfactory. The causes of ineffective learning should be studied by the school and teachers. Low motivation to learn, lack of interest in learning activities, boring learning is one of the factors causing ineffective learning activities. It is necessary to make efforts to encourage students to increase their enthusiasm when learning.

In 2018, the Organization for Economic Cooperation and Development (OECD) proposed the 2030 compass learning framework emphasizing the importance of critical thinking, metacognitive skills, learning to learn skills and the ability to learn attitudes and values [5]. Nowadays, mastering the material is targeted to have the ability to think critically and creatively in accordance with the problem-based learning model used. However, the learning used has not fully supported the right thinking skills, especially in mathematics learning. Many students are not enthusiastic about their interest in learning mathematics due to children's assumptions about math lessons being difficult, the methods used are not appropriate, causing low competitiveness in math learning. This is evidenced by a survey conducted by PISA under the OECD conducted in 65 countries in 2012 which states that the ability of students in Indonesia is ranked at the bottom with a score of 375 [6].

Current mathematics learning activities are considered less effective due to the lack of optimal learning methods provided. It is still often found that students lack understanding of concepts to be able to master mathematical material. The learning activities carried out should provide more engaging activities so that learning concepts can be conveyed properly. The use of the right method will determine the effectiveness and efficiency of learning. So it is necessary to choose a method that supports students to

improve their mindset and motivate themselves to learn math. Teachers have an important role in increasing the attractiveness of students in learning mathematics. The methods that can be chosen should be fun and support interactive learning such as reinforcement-based play, group discussions, and other activities that support fun learning.

Joyful Learning is a learning strategy that develops students' comprehension skills with an emphasis on learning by doing [7]. The learning process by emphasizing fun material is one of the strategies to achieve meaningful learning. Students are more likely to capture the material presented if the learning activities are interesting so that the learning objectives can be realized. The chances of student learning success are also influenced by the mindset in the learning process. The mindset that continues to develop will affect mathematical problem solving when it comes to mathematics learning, mindset is of particular importance. Students with mathematical problem solving and critical thinking skills are among the strongest performers with a growth mindset in overall mathematical achievement (Organization for Economic Cooperation and Development (OECD)).

A more holistic analysis of specific literature studies is needed to provide a clear effect in a mathematics learning mindset to support effective learning. For example, whether joyful learning can foster an effective mindset in mathematics learning remains unanswered. Thus, this article aims to analyze whether joyful learning can effectively foster a mathematical growth mindset in a systematic and supportive manner in mathematics learning. We examine the literature on growth mindset in mathematics education over the past 10 years and provide a more detailed analytical overview of joyful learning and growth mindset models. This review also further discusses representative research and suggests possible pathways for future research.

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## **2 Methods**

### **2.1 Research Design**

This type of research is qualitative research using literature review and correlational design. Correlational design is used to see the relationship between two or more variables[8]. From this design, we can see the relationship between joyful learning model and growth mindset in mathematics learning. The application of a qualitative approach with consideration of the possibility of data obtained in the form of facts that can be analyzed in depth. then the qualitative approach will further encourage the achievement of more in-depth data, especially the involvement of research as the main instrument in collecting data obtained in direct contact with the instrument or object of research.

## **2.2 Data Collection Technique**

Data collection methods are techniques used by researchers to collect data and data collection instruments are tools used by researchers in their activities to collect data so that these activities become systematic and easier. In this study the researcher acted as an instrument as well as a data collector. The procedures used are observation and data analysis. This research uses a literature study, namely the search for some empirical literature that is appropriate and relevant to this theme.

The literature study in this research is based on the results of written works in the form of books, scientific articles in the form of national and international journals. Before the research was carried out, the research design was carried out through the process of synthesizing data on growth mindset by searching related journals through google scholar. The source used as a literature review is in line with this paper then the content contained is adjusted to other literature sources which are summarized to produce new ideas.

## **3 Result and Discussion**

### **3.1 Result**

Mindset is a belief or a set of beliefs or a way of thinking that affects a person's behavior and attitude which will ultimately determine the level of success in life [9]. Mindset can also be interpreted as a belief or set of beliefs or ways of thinking that affect a person's behavior and attitude which will ultimately determine the level of success in life. Meanwhile, success begins with a mindset that will continue into a habit, and habits will determine our fate [9]. The mindset itself is the way a person views everything that happens around him. There are two types of mindset, namely a fixed mindset and a developing mindset. Children with a fixed mindset want to ensure their success for children. However, children with a growth mindset success is related to self-development efforts. It is related to the process of becoming smarter.

Dweck details the mindset theory, which is about two mindsets named fixed mindset and growth mindset. Dweck states that there is a relationship between growth mindset and learning achievement. Students who hold a growth mindset will have better learning achievement than students who have a fixed mindset. From several definitions of mindset above, it is necessary to underline that mindset can be divided into two, namely fixed mindset and growth mindset [10]. Students who have a fixed mindset will view failure as blaming their own abilities and cover up these feelings by blaming others. Meanwhile, students who have a growth mindset when facing failure actually exert all their abilities to learn [9]. Students with a growth mindset realize that mastering new material is difficult and natural in a learning process. Therefore, students also tend to persist in trying and not easily give up when experiencing difficulties in pursuing something, for example in learning math. Unlike the case with people who have a fixed mindset who will tend to believe in innate intelligence from birth, is hereditary, does not like challenges and does not like to be given criticism and suggestions. Thus, growth

mindset is expected to have a positive impact so that students can be motivated to continue learning and try to face challenges in the learning process. For example, when students feel unhappy with math and they think with a fixed mindset, they will immediately avoid trying to do it and prefer to look at their friends' work. In contrast to students who think using a growth mindset, they will certainly want to try because they consider the problem as a new challenge that must be tried and solve [11].

Academic achievement is influenced by the presence of a growth mindset. According to Apostolia's research, students who have a growth mindset will have better achievement than students who have a fixed mindset [12]. Fixed mindset is an intelligence and ability qualities from birth that cannot be changed significantly. Increasing student learning achievement can be influenced by a growth mindset. Mindset is a belief or a set of beliefs or ways of thinking that affect a person's behavior and attitude which will ultimately determine the level of success of his life. Growth mindset itself can be interpreted as a person's belief or belief that the basic qualities of each individual can be processed with certain efforts. Someone who believes that talent, personality and intelligence can be changed or developed by showing effort and hard work.

Growth mindset can be encouraged in mathematics learning. Students who seek challenges and believe that they can grow will be able to learn to find patterns and relationships. This mindset is very relevant to mathematical thinking skills. Students with a growth mindset can enjoy math, dare to try, fail and get up again. This mindset concept is seen from self efficacy, motivation or 21st century skills about creating the best environment for students to learn and develop. These skills benefit students at the high school level and increasingly in university subjects such as calculus, discrete math, linear algebra. Students with growth mindsets had better math grades and test scores than students with fixed mindset.

The belief in learning that is owned will be improved or developed. Growth mindset can be grown by providing a high set of expectations so that students have the enthusiasm to achieve these expectations. The surrounding environment provides its own challenges so that students will try to be active in learning. Learning that is given feedback can also foster a growth mindset in students, because students do not only focus on their personnel abilities. A teacher in growing students' mindset also needs to introduce that the brain can develop in line with the effort to learn.

Based on the four spaces for teaching mathematics, the stages for implementing learning using a growth mindset are, (1) Sorting and selecting, (2) Rules and norms, (3) Mathematical tasks, (4) Feedback and assessment [13]. The role of growth mindset is in line with the Implicit Theories of Intelligence proposed by Dweck, namely the more confident students are that their abilities in mathematics can be improved with an effort, the better their performance in mathematics. Growth mindset in this case as a driver for someone to persevere in trying and learning from previous mistakes. Conversely, when students believe that their abilities cannot be improved, then students tend to interpret failure as a humiliating experience, strengthen the assumption of their limited abilities, and reduce their self-image. Learning outcomes can improve with model-based learning innovations with variance to improve critical thinking and foster mindset.

Meanwhile, Joyful learning is a combination of the words joyful and learning. Joyful means fun while learning means learning. So Joyfull learning is learning that is fun.

Joyful learning is a learning process that is applied to students using a cheerful and fun approach. According to Pailo Fraire [14] joyful learning is learning in which there is no pressure, either physical or psychological pressure. This is because pressure, whatever its name, will only dwarf the minds of students, while freedom, whatever its form, will encourage the creation of a conducive learning climate. Dave Meier states that joyful learning is a learning system that seeks to arouse interest, full involvement, and the creation of meaning, understanding, and happy values in students [15]. Joyful learning is a method, concept and practice of contextual learning, constructivism theory, active learning and child development psychology. Joyful learning is not merely learning that requires children to laugh out loud, but a learning in which there is strong cohesion between educators and students in an atmosphere where there is absolutely no pressure, only mutually supportive communication. The joyful learning strategy is a strategy to arouse the interest and enthusiasm to spur the creativity of learners which is carried out in a fun atmosphere [16]. The purpose of joyful learning is to arouse the ability to learn by providing fun and satisfying learning to achieve competent intelligence for students.

The success of the Joyful Learning method to develop students' mindset towards learning mathematics has been proven in several classroom action studies, including Solikhah and Sudiyono's research [17]. These researchers have applied the Joyful Learning method in class IV on flat building material and angle magnitude material. Besides being used in class action research. The Joyful Learning method has also been used in experimental research, for example in the research conducted by Trinovita. This study examined the effect of Joyful Learning on fifth grade math learning outcomes on whole number counting operations. In addition to providing data on the direction of Joyful Learning on learning outcomes, this study also revealed that learning using Joyful Learning also makes the learning atmosphere fun and attracts students' attention. The joyful learning model approach is one of the learning models that can improve students' mathematical concept skills [15]. As an example of this learning model with an out-of-class play approach on the subject of integers. The results of this study prove that Joyful Learning can have a positive impact on the development of mindset in students.

Mathematics learning is a process of developing students' thinking creativity carried out by teachers to improve the ability of new knowledge of mathematics. Math learning achievement can be improved by using the joyful learning method. The use of joyful learning strategies affects math learning outcomes.[18] The joyful learning strategy is an effort to create a good relationship between educators and students, so that it does not cause feelings of pressure or forced to follow the learning (not under pressure) and can be interspersed with games. This strategy can solve problems in math learning so that the expected learning objectives are achieved.[19]

### 3.2 Discussion

For a student mathematics is not about complex problem solving or logical reasoning, mathematics is computation on paper, and the same computation implemented in a computer is not mathematics anymore. Students have already developed an image about

mathematics but they are afraid of it and doubt their because image about mathematics and about their place and ability within mathematics. Between mathematics and intelligence as mathematics is the foundation of sciences and it is applied in so many fields, it is important that mathematics is available for everybody in the modern world [20]. Individuals have a high intrinsic value of a task, individuals will take it seriously and persist in doing the task because they feel a sense of pleasure when doing the task. In addition, individuals who have a high utility value for a task, the individual will do the task because it is in line and useful for achieving future plans.

Some people assume that intelligence and the ability to think are innate from birth. However, research conducted by Carol S. Dweck states that brain capacity can be developed by influencing the ability to think, one of which is the mindset of the learners themselves. The belief in the existence of a good mindset or thinking can improve students' learning achievement with indicators of success supported by a realistic learning model. The mindset is based on a mindset that develops or is called a growth mindset. A growth mindset is not just about effort. Effort is the key to achievement so that the right strategy is needed. Students with a growth mindset realize that mastering new material is difficult and natural in a learning process. Meanwhile, students with a growth mindset believe that they can improve their abilities by trying. Students with a growth mindset realize that mastering new material is difficult and natural in a learning process. Therefore, they also tend to be persistent in trying and not easily give up when experiencing difficulties in pursuing something, for example in learning math. Unlike the case with people who have a fixed mindset who will tend to believe in innate intelligence from birth, is hereditary, does not like challenges and does not like to be given criticism and suggestions. Thus, growth mindset is expected to have a positive impact so that students can be motivated to continue learning and try to face challenges in the learning process.

The development of a student mindset (growth mindset) in schools, among others, includes the ability of students to work in abstraction towards conceptualization. The implication is that learning must provide varied experiences by using an effective and varied method. The success or failure of a lesson can be seen from the learning outcomes using several methods. Therefore, the use of appropriate and varied methods determines the effectiveness and efficiency in achieving mathematics learning. Some methods that math teachers can choose are lecture, joyful learning, expository, demonstration and question and answer methods. From the analysis of the literature study that mathematics learning should be done with less lectures and teacher-centered methods. This is as stated by Rahyubi, the lecture method will make students passive, student success is not measurable, contains an element of coercion to students, student attention and motivation are difficult to measure, talk often wanders and teaching activities feel boring. Joyful learning can increase students' learning motivation and learning outcomes in mathematics materials [21]. Learning using joyful learning provides a fundamental meaning that the atmosphere supports effective and communicative learning between students and teachers is an undoubted thing. The principle of joyfull learning is to make students happy and know the purpose of the learning that is done. The ele-

ments of joyful learning are teacher characteristics, classroom design, teaching strategies, and assessment.[16] The use of this method can be done by providing learning activities with games according to the material presented.

The joyful learning model has learning steps such as: The preparation stage where this stage is related to the preparation of students to learn; The delivery stage which at this stage focuses on the teacher has a role in delivering the initial material that can attract students' attention; The training stage is learning made as interesting as possible, for example a student-centered quiz; A good closing stage is that the teacher provides reinforcement of the material presented, followed by concluding the learning with students.[22] An example of learning done with the joyful learning method is with ice breaking so that students are not depressed about the lesson delivered then the teacher delivers the material where each material has a quiz. If students can answer the quiz correctly then they will be rewarded, and at the end of the session the teacher provides a learning conclusion. Practices stated by several researchers in their research on elementary school students almost 50% of students who learn using joyfull learning method can increase students' interest in learning and learning achievement. There are studies that use joyfull learning including research conducted by Istiani and Pramesti which both concluded that the use of joyfull learning models can improve learning outcomes. Furthermore, Gendari provides results that the joyfull learning model can increase motivation and learning outcomes [17]. Prihatnani, concluded that joyful learning is effective for improving learning outcomes and reducing student anxiety in learning math [18]. From some of these studies, it strengthens the selection of joyful learning strategies as an effort to increase growth mindset in learning mathematics where the success factors are proven to increase growth mindset in students who have a fixed mindset in learning mathematics [23].

Increasing growth mindset in students in learning mathematics can use the concept of joyfull learning so that students who learn mathematics can be motivated to study harder and help in capturing the learning concepts presented. Students who have a fixed mindset can be facilitated by joyful learning which conceptualizes learning activities by exploring and solving problems with fun activities. Students who have the mindset that math is difficult, boring math can be helped by the joyfull learning model by providing new interesting beliefs so that these students are active in the learning process. Thus the effectiveness of learning will run well. Mindset development theory has been a topic that has gained international attention as a possible way to assist in improving a variety of student outcomes. Most of the mindset development interventions are usually more focused on middle school students or older [24],[25]. In this case, students should also believe in hard work and effort. However, a growth mindset is more than just effort as students must learn how to try new approaches, use available resources, and seek feedback. Because a growth mindset is not enough to predict success.

## 4 Conclusion

Growth mindset is a belief about individual intelligence to develop in the face of challenges. Dweck divides the concept of mindset into 2 types, namely fixed mindset and growth mindset. The role of the teacher is very influential on the development of mindset in students who have a fixed mindset so that appropriate methods are needed in learning mathematics. Joyful learning plays a role in improving student achievement in learning mathematics. The application of this method helps motivate students who have a fixed mindset to switch to a growth mindset in math learning activities. Thus, the learning objectives of mathematics can be conveyed optimally. So from this research it can be concluded that learning activities using joyful learning can improve students' growth mindset.

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