

The Effect of a Growth Mindset on the Chemistry Learning Process Among 11th-Grade Students in Class XI-P2 at SMAS Bhaktyarsa Maumere in 2024

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ABSTRACT

This research aims to analyze the tendency of growth mindset and fixed mindset and their relationship with the chemistry learning process in the perspective of educational psychology. The research used a mixed method approach, namely a descriptive quantitative and qualitative approach with a total sampling technique for 34 students of SMAS Bhaktyarsa Maumere. The instrument used was a Likert scale-based mindset questionnaire that has been tested for validity and reliability. Data analysis was carried out through simple descriptive and correlational statistics. The results showed that 55.9% of students were in the fixed mindset category and 44.1% in the growth mindset category. The validity test showed most of the instrument items were feasible for use in the study, while reliability was in the category of sufficient. The findings indicate a tendency to have a positive relationship between growth mindsets and the quality of the chemistry learning process, especially in the aspects of perseverance, response to difficulties, and learning motivation. However, the strength of the relationship obtained in this study has not fully demonstrated a causally significant influence, so further research with a stronger inferential design is needed.

INTRODUCTION

The learning process is an important part of educational activities because through this process there is a transformation of knowledge, skill formation, and the development of students' attitudes. Biggs and Tang (2011) through the concept of constructive alignment emphasized that the alignment between objectives, learning activities, and evaluation is an important factor in determining the quality of students' academic achievements. However, the success of learning is not only determined by instructional design or teaching methods. Internal psychological factors of students also play an important role. According to John W. Santrock (2011), motivation, self-confidence, and emotional conditions affect student involvement in the learning process. This means that the same learning process can produce different outcomes due to variations in students' psychological factors. One of these important factors is the mindset, especially known as the growth mindset (Jin et al., 2025; Limeri et al., 2020; Sisk et al., 2018; Wolcott et al., 2021).

According to Dweck (2006), a growth mindset is the belief that a person's intelligence and abilities are not fixed, but can be developed through effort, the right strategy, and support from the environment. In contrast, a fixed mindset is the belief that talent and intelligence are innate and cannot be significantly changed. Students with a growth mindset tend to show perseverance in learning, do not give up easily when facing difficulties, and are more open to feedback. They see challenges as opportunities to grow, not as obstacles. On the other hand, students with a fixed mindset tend to avoid challenges, are afraid of failure, and consider their abilities to be limited to their natural talents (Dweck 2006). These differences in beliefs have a direct impact on how individuals respond to challenges, failures, and feedback. Students with a growth mindset tend to see difficulties as learning opportunities and show higher perseverance, while students with a fixed mindset are more prone to avoiding challenges for fear of being considered incapable (Dweck, 2012).

Previous studies have examined the relationship between growth mindset and academic outcomes across various subjects. Research by Kristiani Dari', Yunus, and Az-Zahra (2022) investigated the influence of growth mindset on mathematical problem-solving ability among SMA Negeri 18 Makassar students using simple linear regression analysis, finding a significant but very low influence (11%). Similarly, studies by Ramadhanti et al. (2024) examined the effect of growth mindset and learning motivation on economics learning outcomes, while Rohim et al. (2025) investigated the influence of self-efficacy, growth mindset, and grit on students' critical thinking skills in mathematics. Yeager et al. (2019) conducted a national experiment across the United States, revealing that growth mindset interventions improved achievement particularly among students with lower academic performance. Despite these contributions, several limitations persist. First, most studies employ quantitative approaches that emphasize statistical relationships without exploring how growth mindset manifests in actual learning behavior. Second, the majority of research focuses on mathematics or economics, leaving the role of growth mindset in chemistry learning relatively underexplored. Third, previous studies rarely integrate observational data to validate questionnaire findings, creating a gap between self-reported mindset and classroom behavior (Danino & Maoz, 2025; Fuller et al., 2018; Han, 2023; Zhang & He, 2024).

Data from the Programme for International Student Assessment (PISA) 2018 reveals that only 29% of Indonesian students possess a growth mindset, a concerning figure that warrants attention, including at SMAS Bhaktyarsa Maumere. According to Huddle et al. (2000) and Hidayah et al. (2016), chemistry is a subject often perceived as difficult by students, characterized by their inability to grasp chemical concepts correctly. This challenge is evident at SMAS Bhaktyarsa Maumere, particularly in grade XI-P2, where students perceive chemistry as difficult, with some believing it is beyond their talent or ability. This mindset leads them to give up easily when facing challenging problems, resorting to cheating or completing tasks carelessly. To achieve effective learning, students' cognitive abilities must be complemented by a constructive mindset toward the learning process, particularly a growth mindset (Mohamoud, 2024; Ricci, 2024; Wilson & Conyers, 2020; Xu et al., 2021).

The novelty of this research lies in its focus on chemistry learning—a subject often considered difficult and underexplored in growth mindset studies—and its mixed-method approach combining questionnaires with classroom observations to validate consistency between self-reported mindsets and actual student behavior. Conducted at SMAS Bhaktyarsa

Maumere in East Nusa Tenggara, this study addresses an underrepresented context where students' educational challenges differ from those in urban areas. Unlike previous quantitative studies that primarily measure growth mindset's effect on academic outcomes, this research explores the relationship between mindset tendencies and learning behaviors—perseverance, response to difficulties, and motivation providing richer insights into the psychological dynamics of chemistry learning (Sahagun et al., 2021; Wang et al., 2021).

Based on this problem, this research needs to be conducted to analyze the growth mindset of students in chemistry learning at SMAS Bhaktyarsa Maumere. Thus, this research is expected to provide a deeper understanding of the growth mindset of students in the learning process and become the basis for developing learning strategies that can encourage a more positive learning attitude.

METHOD

Mixed methods research combined quantitative and qualitative approaches to obtain a more comprehensive picture of the growth mindset of students in chemistry learning at SMAS Bhaktyarsa Maumere. This research was conducted from May 19, 2024 to June 10, 2024 with a total of 34 respondents from grades XI-P2 of SMAS Bhaktyarsa Maumere. Data collection was carried out through questionnaires and observations. The questionnaire was used to measure growth mindset tendencies based on attitudes towards learning difficulties, perseverance, and belief that abilities can develop. The instrument uses a Likert scale of 1-4. The questionnaire consisted of 10 statements compiled based on growth mindset indicators. The questionnaire data was processed using the Likert scale scoring method with a maximum score of 40 and a minimum score of 10. Respondents with a score of ≥ 25 were categorized as growth mindsets, while < 25 scores were categorized as fixed mindsets. Observations were carried out to see the behavior of students during chemistry learning, including attitudes when facing difficulties, participation, activeness in asking questions or discussing, and efforts in completing tasks. The data analysis process in this study refers to the qualitative data analysis model proposed by Matthew B. Miles and A. Michael Huberman which includes three stages, namely data reduction, data presentation, and conclusion drawn.

RESULT AND DISCUSSION

The results of the questionnaire showed that 15 respondents admitted to having a growth mindset tendency, while 19 respondents showed a fixed mindset tendency. These findings indicate that although some students have shown a growth mindset, the majority of students still have a fixed mindset. After that, the research instrument was tested for reliability using the Alpha Cronbach method developed by Lee Cronbach. Based on the results of data processing, an Alpha Cronbach value of 0.69 was obtained. This result is declared reliable in accordance with the statement of Ghozali (2020) who stated that the research can be said to be reliable if the Cronbach Alpha value > 0.600 . However, in this study, there are still other variables such as fixed mindset that are quite dominant, thus showing that many students do not fully have a growth mindset. This is due to several factors such as an environment that does not support the development of a growth mindset, a lack of understanding of what a growth mindset is, and the benefits of a growth mindset.

The results of the questionnaire were then strengthened by the results of observations made during the chemistry learning process. Based on the results of observations with indicators of recording material, doing practice questions, and daring to ask questions when experiencing difficulties, students with a growth mindset tend to be more active in following the learning process in the classroom. In accordance with the questionnaire data, there were 13 students who showed growth mindset behavior and 19 students showed fixed mindset behavior. This shows a bias when filling out the questionnaire, where 2 respondents stated that they had a growth mindset, but the observation results of these 2 respondents showed fixed mindset behavior. This is supported by Carol Dweck's statement in her book entitled "Mindset – The New Psychology of Success". People with a fixed mindset tend to always want to appear and look smart because they believe that they are born with a fixed level of intelligence that cannot be modified.

Based on the results of the questionnaire and observations, it can be seen that there is a fairly strong consistency. Students who showed a growth mindset tendency in the questionnaire also tended to show active behavior in learning. On the other hand, students who have a fixed mindset tendency tend to show passive behavior.

Growth mindset shows a relationship with students' learning attitudes in chemistry learning. Students with a growth mindset tend to be more active in taking notes, diligent in working on problems, focused on learning, responsible for assignments, and dare to ask questions. This shows that a growth mindset contributes to shaping better learning engagement. This finding is in line with Carol S. Dweck's theory that individuals with a growth mindset view effort as the main factor in improving their abilities. In the context of complex chemistry learning, this mindset encourages students to not give up easily and be more open to the learning process. Students with a growth mindset tend to be able to follow the learning process more optimally compared to students who have a fixed mindset. Nevertheless, such relationships cannot be fully considered cause-and-effect, as other factors such as learning methods, classroom environment, and early abilities can also influence students' learning behavior. Thus, growth mindset has a tendency to affect the chemistry learning process, especially in increasing positive learning attitudes, although it still requires further reinforcement and study.

CONCLUSION

Based on the entire research process which includes data collection through questionnaires and observations, as well as quantitative descriptive data analysis, it can be concluded that there is a relationship between growth mindset and students' learning attitudes in chemistry learning. The questionnaire instrument used has been tested for reliability using the Cronbach Alpha test and shows that the data obtained is classified as reliable, so it is suitable for use as a basis for analysis. The results of the study show that some students have a tendency to grow mindset which is reflected in active behavior, perseverance in facing difficulties, and courage in asking questions. However, some still show a fixed mindset, which is characterized by a passive attitude, easy to give up, and lack of confidence in facing challenges. These findings are strengthened by observational results that show the compatibility between the questionnaire data and the real behavior of students in the classroom. Thus, growth mindset has a positive impact on students' learning attitudes and behaviors in

chemistry learning, even though its application is not evenly distributed. Therefore, more consistent efforts are needed from educators to grow and strengthen the growth mindset in order to improve the quality of learning optimally. In addition, the results of this study also show that other factors outside of mindset may also affect learning outcomes, so it needs to be considered in future research.

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