

The analysis of primary school student's motivation toward science learning

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Abstract: This research aims to analyze primary school students' motivation to learn science. Differences in student grades and gender were also examined in this research. The research has used survey methods. The survey was carried out on 97 students at one of the elementary schools in Malang City. The students who participated were those in grades 4, 5 and 6. A questionnaire containing 35 statement items measured students' motivation toward science learning. The analysis uses ANOVA to measure differences in motivation based on grade, gender, and interactions between grade and gender. There is no influence of grade and gender on students' motivation to learn science. On average, students' science learning motivation is good. Female students dominate the overall motivation score (M), active learning strategies (ALS), self-efficacy (SE), performance goal (PG), and science learning value (SLV), while achievement goal (AG) and learning environment stimulation (LES) dominate the male student scores. The student's PG was weak. This indicates that students study science not to improve their performance but to get attention and be considered the best by others.

Keywords: Learning environment, learning value, motivation, science learning

Analisis motivasi siswa sekolah dasar terhadap pembelajaran sains

Abstrak: Riset ini bertujuan untuk menganalisis motivasi belajar sains siswa primary school. Perbedaan grade dan gender siswa juga turut diteliti dalam riset ini. Penelitian telah menggunakan metode survey. Survey dilakukan terhadap 97 siswa di salah satu sekolah dasar di kota Malang. Siswa yang berpartisipasi adalah mereka yang berada di grade 4, 5 dan 6. Pengukuran motivasi belajar siswa terhadap pembelajaran sains menggunakan angket yang berisi 35 item pernyataan. Analisis menggunakan ANAVA untuk mengukur perbedaan motivasi berdasarkan grade, gender dan interaksi antar grade dan gender. Tidak ada pengaruh grade dan gender terhadap motivasi siswa untuk belajar sains. Rata-rata motivasi belajar sains siswa adalah baik. Siswa female mendominasi pada overall skor motivasi (M), active learning strategies (ALS), self-efficacy (SE), performance goal (PG), and science learning value (SLV), sedangkan skor male student didominasi pada achievement goal (AG) and learning environment stimulation (LES). PG siswa adalah lemah. Ini mengindikasikan bahwa siswa dalam belajar sains tidak untuk memperbaiki performa mereka sendiri, tetapi hanya untuk mendapat perhatian dan dianggap terbaik oleh orang lain.

Kata Kunci: Lingkungan belajar, nilai belajar, motivasi, pembelajaran sains

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INTRODUCTION

Science learning is very important learning to implement since elementary education so that students can develop the nature of curiosity, make decisions, solve problems, and study natural phenomena in the surrounding environment (Syahfitri et al., 2023). Science teaches children from basic education to be close to nature, especially in everyday environments, so that students can understand natural science, because every human being must live side by side with nature (Jannah & Atmojo, 2022). Science learning does not only teach students to memorize and listen to explanations of material from the teacher, but science learning teaches students to interact directly with nature. Therefore, the environment becomes very useful and becomes a source of science learning (Anggraini & Efendi, 2023). Creating an appropriate and innovative learning environment can increase student learning motivation

Motivation to learn arises because of external and internal stimuli that encourage students to act in a way that leads to successful learning (Syachtiyani & Trisnawati, 2021). Motivation plays an essential role in learning because it can influence the amount of student effort in learning (Suprihatin, 2015). Learning motivation can encourage students' desire to learn to achieve the expected learning outcomes (Lina et al., 2021). High learning outcomes can be achieved by students who have a high enthusiasm for learning. Therefore, the more motivated students are, the stronger their enthusiasm for learning and the more successful they will be in their academic endeavors (Hamdu & Agustina, 2011).

Motivation is an inner force that guides our thoughts, feelings, and actions, characterized by goal-directed behavior and persistence, enabling individuals to work tirelessly toward achieving their goals (Mubeen & Reid, 2014). The central dogma of academic performance and critical thinking in school science is largely influenced by the motivation and interests of students in science learning (Libao et al., 2016). Motivation is the driving force behind students' actions, influenced by their willingness, interests, and volition (Beal & Stevens, 2011). Students' responses and reactions to science are influenced by internal and external motivation, which controls their behavior, learning, and thinking (Krishan & Al-rsa'i, 2023). Internal motivation boosts the desire to achieve education goals and drives student behavior toward learning (Samawi & Al-Assaf, 2013). External motivation refers to behavior driven by external rewards such as money, fame, grades, and praise (Bourgeois et al., 2016), or an adequate environment (Nuraini & Laksono, 2019).

The learners' creativity was showcased through cooperative work, where each student was assigned a role based on their abilities, thereby increasing their motivation towards learning science (Krishan & Al-rsa'i, 2023). Pratama et al. (2019) have researched how learning motivation contributes to student achievement in science. This researcher found that students' learning motivation to study science in elementary schools was influenced by the presence of motivation. Febriandari et al. (2018) found that teacher creativity influences students' learning motivation in elementary schools. There are three things they found related to motivation, namely: lack of attention causes some students to have no motivation during the learning process, motivation is related to student learning achievements, and ice breaking, which is teacher creativity in learning, is related to elementary school students' motivation.

Primary school students' learning motivation is not optimal (Edu et al., 2021). These researchers found in their review that teachers play a role that causes student motivation

to be suboptimal. They explained that the learning environment, learning methods, and rewards are determining factors in student motivation. Research by Prananda and Hadiyanto (2019) has found that the motivation to learn science in elementary school students is mostly medium, and around 30% is low. This researcher also found that there is a relationship between motivation and student learning achievement. The reason why students' learning motivation is not optimal in science is students' boredom in learning (Rahma et al., 2016). Other research by Darmayanti et al. (2021) also found that more than 70% of students still had fairly good motivation. According to them, teachers, parents, and themselves are the determining factors for optimal student motivation. Based on previous research findings, an analysis of student motivation toward science learning is needed. This finding is important because it serves as a basis for teachers to design their learning.

Bojović and Antonijević (2017) also researched elementary school students' learning motivation. Their research has practical pedagogical implications, including understanding how the teaching process can motivate students and new strategies. This also raises teachers' thoughts about their role in creating a motivating teaching process. However, limitations include reliability and validity issues due to the use of self-reporting. Cavas (2011) has used a valid and reliable instrument developed by Tuan et al. (2005) to measure primary school students' science learning motivation. Their findings show that students have high motivation and female students are more motivated to learn than male students in learning science. Other findings also show that differences in class levels have contributed to differences in primary school students' science learning motivation. Thus, this research aims to analyze primary school students' motivation to learn science. Differences in student grades and gender were also examined in this research.

METHOD

The research has used survey methods. The survey was carried out on 97 students at one of the elementary schools in Malang City. However, data processing was only carried out on 94 students because the data of three students could not be analyzed. Three students were not analyzed because two people were not present and one person did not fill out the entire questionnaire, so their data was not allowed for analysis. Students who participated in this research were taken using the convenience sampling technique by contacting the school principal to provide information on data collection. This sampling was carried out by first contacting the target organization to inform them of data collection at that location (Apolinário et al., 2023). Participating students are those in grades 4, 5, and 6.

The motivation instrument that has been used was developed by Tuan et al. (2005), and used by Sevinc et al. (2011) to measure primary school motivation in Türkiye. The validity and reliability values of the questionnaire used have been met (see Ruan et al., 2005). We have also done an analysis based on the data collected and found the reliability is 0.760 (It is reliable). Instruments are given to students using paper and pencil. Researchers visited schools and distributed them to students in grades 4, 5, and 6. Motivational instruments include indicators of self-efficacy (SE), active learning strategies (ALS), science learning values (SLV), performance goals (PG), achievement goals (AG), and learning environment stimulation (LES).

Learning motivation was calculated based on the overall motivation score (M), and each indicator score is differentiated based on grade and gender. Student motivation is said

to be excellent if the score range of 80-100, good (70-79), moderate (60-69), weak (40-59), and < 40 is very weak (Kurniawan et al., 2021). Calculate motivation data using ANOVA by looking at the interaction effect between grade and gender. Normality and homogeneity are carried out first before ANOVA is carried out. Data on learning motivation achievements based on average scores is presented in this research.

RESULTS

This research has collected data on the results of measuring student learning motivation. The findings show that there are differences in average scores based on the overall motivation score (Figure 1), gender (Figure 2), and the interaction effect of grade and gender (Table 3).

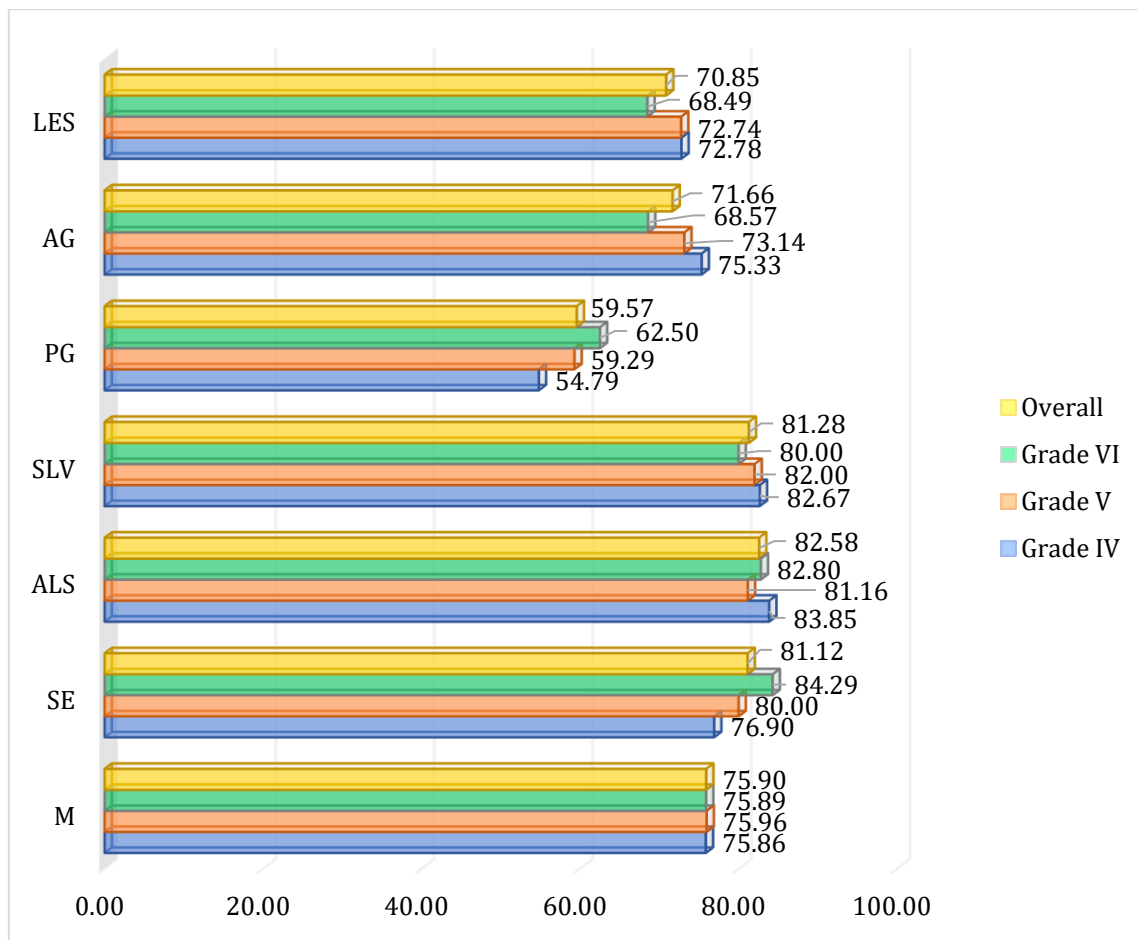


Fig. 1. Achievement of student learning motivation

Figure 1 shows the achievements of student motivation. The overall motivation score (M) provides information that science learning has motivated students well. None of the students in each grade indicated weak motivation. These findings indicate that science learning carried out by teachers has motivated students to learn. The average score for the good category was also found in the AG and LES indicators. These two indicators also have similar results to the overall motivation score. Students in grade 4 had moderate AG and LES, but showed greater scores in grades 5 and 6. Findings revealed that the higher the student's grade, the better their AG and LES. The science learning that has been

implemented by the teacher has made the AG and LES of grade 5 and 6 students good, but moderate for students in grade 4.

Another finding presented in Figure 1 is that the overall score for the SLV, ALS and SE indicators was found to be excellent. This indicates that science learning has strengthened students' self-confidence in their ability to learn and understand science material. Another indication is that science learning has turned students into active learners. Students consider science to be an important subject for them. Students' ALS improved as their level of learning increased, but grade 5 students showed lower scores than the other two grades. Students' SLV scores indicate that the higher their grade, the more important science is to them. However, students' SE scores revealed that the higher their grades, the lower their confidence in their ability to learn science. Even though there is a decline, it does not weaken students' SE. The findings show that students' scores are still in the good category, even though grades 4 and 5 are excellent.

Different findings found in this research are related to students' PG. The data in Figure 1 reveals that students' PG is weak. This indicates that students study science not to improve their own performance, but only to get attention and be considered the best by others. Students in grade 4 show moderate performance goals, but this decreases as their grade level increases. These findings indicate that the higher a student's grade, the more their performance goals decrease.

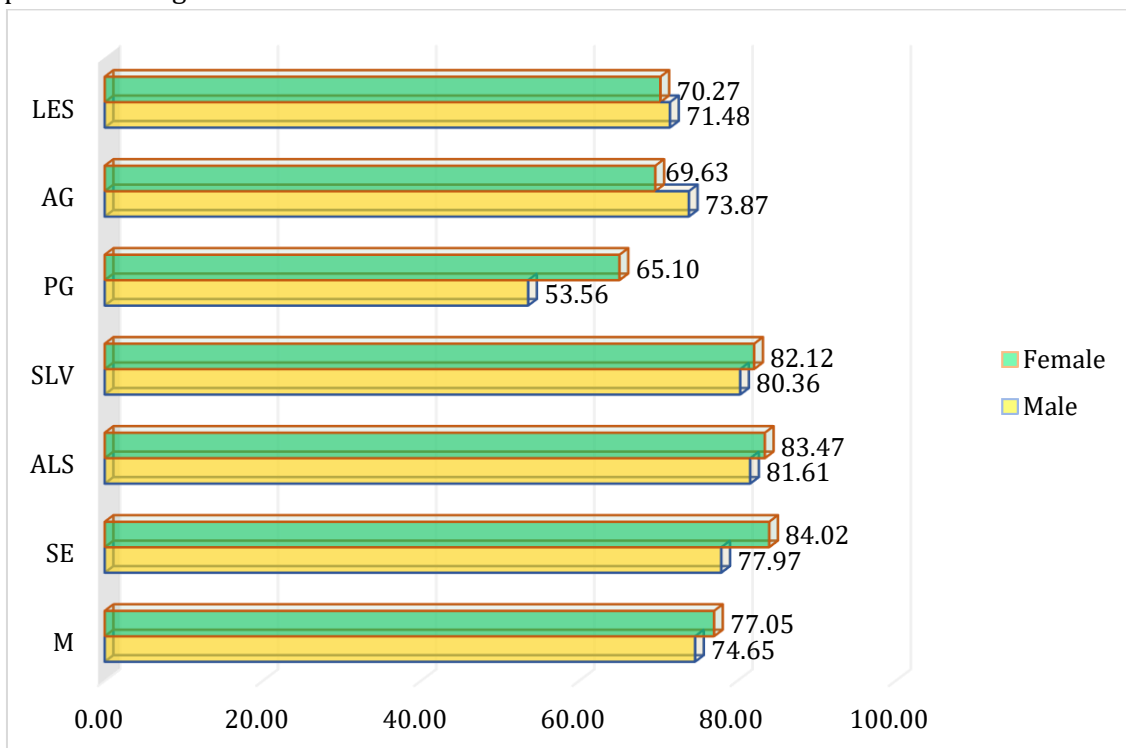


Fig. 2. Achievements of male and female students learning motivation

Figure 2 reveals that female students dominate the overall score of motivation (M), performance goal (PG), science learning value (SLV), active learning strategies (ALS), and self-efficacy (SE), while the scores of male students are dominated by AG and LES. achievement goal (AG), and learning environment stimulation (LES). A striking difference is found in the SE indicator, where male students are in a good category while female students

are excellent. In the AG indicator, female students are in the moderate category while male students are in the good category. In the PG indicator, male students are weak while female students are moderate. The similarities in the categories for both genders are that the LES and overall scores reach the good category, while the SLV and ALS indicators reach the Excellent category.

Table 1. Data normality test

| | | Grade IV | Grade V | Grade VI | Male | Female |
|----------------------------------|----------------|----------|---------|----------|---------|---------|
| N | | 24 | 28 | 42 | 45 | 49 |
| Normal Parameters ^{a,b} | Mean | 75.8567 | 75.9586 | 75.8912 | 74.6538 | 77.0492 |
| | Std. Deviation | 5.69453 | 5.60311 | 6.86835 | 6.19068 | 5.96327 |
| Kolmogorov-Smirnov Z | | 0.565 | 0.641 | 0.770 | 0.601 | 0.905 |
| Asymp. Sig. (2-tailed) | | 0.907 | 0.806 | 0.593 | 0.863 | 0.385 |

The results of data normality testing (Table 1) indicate that all data is normal. Sig. value indicates that it is greater than 0.05.

Table 2. Homogeneity test

| F | df ₁ | df ₂ | Sig. |
|-------|-----------------|-----------------|-------|
| 0.370 | 5 | 88 | 0.868 |

The results of testing the homogeneity of motivation data (Table 2) indicate that the data is homogeneous. Next, ANOVA testing can be carried out.

Table 3. ANOVA results

| Source | Type III Sum of Squares | df | Mean Square | F | Sig. |
|-----------------|-------------------------|----|-------------|-----------|-------|
| Corrected Model | 155.738 ^a | 5 | 31.148 | 0.813 | 0.544 |
| Intercept | 493219.685 | 1 | 493219.685 | 12871.521 | 0.000 |
| Grade | 2.084 | 2 | 1.042 | 0.027 | 0.973 |
| Gender | 135.301 | 1 | 135.301 | 3.531 | 0.064 |
| Grade * Gender | 17.290 | 2 | 8.645 | 0.226 | 0.798 |
| Error | 3372.044 | 88 | 38.319 | | |
| Total | 545078.837 | 94 | | | |
| Corrected Total | 3527.782 | 93 | | | |

The results in Table 3 indicate no differences in student motivation based on their grade (sig. = 0.973 > 0.05). This indicates that students are motivated to participate in science learning carried out by their teacher. Other data findings show no influence of gender differences on students' motivation in learning science (sig. = 0.064 > 0.05). Male and female students are equally motivated to take part in science lessons carried out by

their teachers. The third finding indicates that there is no interaction effect of gender and gender on students' motivation in learning science (sig. = 0.798 > 0.05). Figure 3 shows the intended interaction effect.

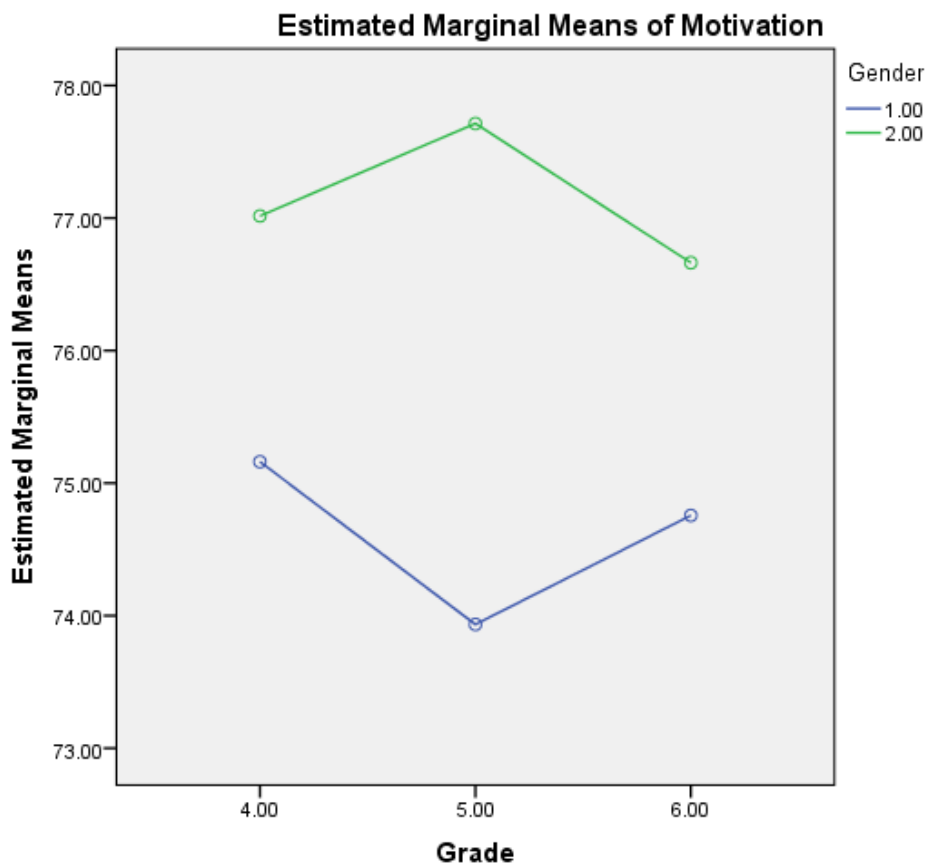


Fig. 3. The interaction effect of grade and gender

DISCUSSION

Overall score of motivation towards science learning

This research has revealed the fact that there is no difference in student motivation in terms of grade and gender. Even analysis of the interaction between these two variables did not cause differences in students' motivation to study science. Elementary school students are well motivated to study science (M average is 75.90). The findings of Libao et al. (2016) are in line with research that there is no difference in respondents' motivation to study science. However, other research shows that there are differences in primary school motivation for science learning (Cavas, 2011). There is no interaction effect of grade and gender on student motivation. In other research, it was found that gender has an influence on students' motivation to learn science in primary schools (Sevinc et al., 2011). The results of research by Sirait et al. (2022) found that there are differences in student motivation between females and males. The findings Zeyer (2018) explain that gender has no direct effect on students' motivation to study science. This indicates that there are differences in science teaching in schools that cause differences in the results from previous research with the data we found. Learning should not cause differences in students' motivation. Students must have the same motivation in order to learn science well.

Motivation is what drives students to learn and achieve their goals. In science, motivation has the benefit of improving learning outcomes (Insar Damopolii et al., 2018; Yurida et al., 2021) and correcting student misconceptions (Harso et al., 2021). Our research found that primary schools are motivated towards science learning. Students are able and try to understand science subject matter. They consider that learning science is important, participating in science learning is not only to be considered smart but is indeed the aim of improving performance, feeling satisfied, and learning is interesting which motivates them to participate in science learning. The challenge for science teachers in learning is how they teach students who have different motivations (Krishan & Al-rsa'i, 2023). Primary schools have good learning motivation because they feel comfortable with the teacher's way of teaching. In this research, it is indicated that the student's score reached 70.90. The way teachers teach science determines the level of student motivation (Kurniawan et al., 2021; Yurida et al., 2021).

Self-efficacy

Self-efficacy as an indicator to measure students' motivation towards science learning (Tuan et al., 2005). In this research it was found that students' SE as a whole was Excellent. The measurement results reveal that SE decreases if students have reached a higher grade level. This decline could be caused by students not being confident in understanding difficult science concepts. Questions that try to find this information get the lowest score from the seven questions in the SE. A younger person's interest and understanding of science issues has an impact on engagement in science related to SE, and the atmosphere of the learning environment also contributes (Lu et al., 2023). Thus, this is the reason that the higher a student's grade, the more their SE decreases. This research also reveals that gender contributes to differences in students' SE. Male students only achieved the good category while the students achieved the excellent category. This finding is different from that found by İnce (2023) who found that male students had a higher level of self-efficacy than female students in secondary school. Our research has indicated that students' SE towards science learning has not worsened, there are only differences based on average scores, and in this research this only applies to primary school students.

Active learning strategie

Active learning strategies used by teachers during learning contribute to student understanding, student activity and students' ability to relate to their previous understanding (Baransano et al., 2017; Damopolii et al., 2019; Pambudi et al., 2022). Our measurement results show that teachers' teaching habits in science learning have helped students to find strategies that are suitable for them to understand and relate scientific concepts, be able to find learning resources and carry out discussions with their friends and teachers, and if they make mistakes, they will try to find out about the mistakes. the. Active student learning is a strategy that encourages students to participate actively in the learning process through collaboration and discussion rather than passively receiving information from the teacher (Lee et al., 2018).

Science learning value

Science learning value (SLV), also known as task value, is an important factor in forming students' motivation to learn science (Tuan et al., 2005). Task values formed from several interconnected components can predict achievement results well (Chang, 2015). In this research, the students' SLV scores were excellent. These findings indicate that science learning has succeeded in motivating students and is important for students. Science can stimulate students' thinking, apply concepts in everyday life, solve problems, investigate and satisfy students' curiosity. The higher a student's grade, the better their SLV score. It's just that in this research the female SLV score was higher than the male. SLV is a factor in forming students' motivation to learn science in the form of scientific activities (Shin et al., 2019). When educators want to facilitate from a motivational perspective, then the task value / SLV needs to be considered (Wang & Liou, 2017). Thus, SLV becomes a supporting factor in improving student motivation in learning science.

Performance goal

PG is the most dominant determinant of learning motivation which is related to students' awareness of what is expected of them, this plays an important role in shaping their motivation to learn (Rana et al., 2015). In PG learning, students are not just involved in science learning and then expect recognition from other people or attention from their teachers. PG is more in the direction of what students expect after they study science. It encourages them to engage in science learning. In this research, students' PG score achievements were included in the weak category, where male students had higher scores than female students. These findings indicate that in science learning students are still not aware of what they need. They still think that by participating in science lessons they will get good grades, be better than their friends, think they are the smartest and will get attention from their teachers. PG is a determining factor in student motivation in science (Tuan et al., 2005). These research findings are the basis for developing PG and making students aware that they must achieve their performance according to their expectations.

Achievement goal

Research results have found that students' AG is in the good category, the higher the students' grade, the better their motivation to learn science. Likewise with gender differences, it was found that males were better than females. Although statistical analysis did not show any differences. AG is one of the factors that supports students' motivation to learn science. Motivation is the learner's driving force to perform an activity and achieve a specific goal (Krishan & Al-rsa'i, 2023). In science learning, when students feel satisfied, able to solve problems, confident in the material being studied, teachers and friends accept their ideas and get good grades in exams, it becomes an incentive for them to study science. Our research has measured this and found that statements related to this have scored well. Statements that have a low score relate to the acceptance of their ideas by their friends. This is what is thought to cause the difference between females and males and the low motivation of grade 4 students, but the difference is not significant.

Learning environment stimulation

The research results found that LES as a whole is good. The higher the student's grade, the better their motivation to learn science. Likewise with gender differences, it was found that males were better than females. However, it did not show any significant differences. In other research by (Cavas, 2011) also found the same thing, that in the LES aspect of male and female students did not show significant differences. The right science learning environment can enable students to view science as more useful for personal and communal purposes, become more interested in science classes, and aspire to pursue science-related careers (Shin et al., 2023). An innovative and interesting learning environment when studying science has made students interested in learning. Teaching methods are varied, students are involved in discussions, challenging learning has stimulated students to be encouraged to learn science. Varied learning that emphasizes constructivism and collaboration is appropriate learning in science classes, and it motivates students (Cetin-Dindar, 2015; Nunaki et al., 2019). However, this research found that teachers' focus on students still needs to be improved. Questions related to teacher focus received the lowest score of all the questions in the LES aspect.

CONCLUSION

This research concludes that there is no influence of grade and gender on students' motivation to study science. On average, students' science learning motivation is good. Female students dominate the overall motivation score (M), self-efficacy (SE), active learning strategies (ALS), science learning value (SLV), and performance goal (PG), while the male student scores are dominated by AG and LES. achievement goal (AG), and learning environment stimulation (LES). Different findings found in this research are related to students' PG. The student's PG is weak. This indicates that students study science not to improve their own performance, but only to get attention and be considered the best by others.

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