ISSN (Online): 2455-3662
EPRA International Journal of Multidisciplinary Research (IJMR) - Peer Reviewed Journal
Volume: 11| Issue: 1| January 2025|| Journal DOI: 10.36713/epra2013 || SJIF Impact Factor 2024: 8.402 || ISI Value: 1.188

TEACHER-STUDENT RELATIONSHIP AND ACADEMIC EMOTIONS AS PREDICTORS OF LEARNING ATTITUDE OF STUDENTS IN SCIENCE

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Article DOI: https://doi.org/10.36713/epra19952
DOI No: 10.36713/epra19952

ABSTRACT

This study aimed to investigate the influence of teacher-student relationships and academic emotions on the learning attitudes of Grade 10 science students in four public secondary schools in Davao del Norte, Philippines. Using a descriptive-correlational design and validated questionnaires, data were collected from 301 students. The instruments used were the Teacher Student Relationship Inventory (S-TSRI), the Academic Emotions Scale (AES), and the Attitude Towards Science Learning (AtSL) questionnaire. The study revealed that the respondents' teacher-student relationship is highly extensive, academic emotions are felt and learning attitudes in science are evident. Moreover, the results show that both teacher-student relationships and academic emotions significantly predicted learning attitudes towards science. The study concluded that strong teacher-student relationships and positive academic emotions are crucial factors in fostering positive learning attitudes towards science. Lastly, students, parents, teachers, school administrators, DepEd officials, and other researchers would all benefit from this study by learning more about the factors that affect student's learning attitude. The study recommends that schools prioritize fostering positive teacher-student relationships, promoting positive academic emotions, and implementing strategies to enhance student engagement in science.

KEYWORDS: *science education, teacher-student relationship, academic emotions, learning attitude in science, grade 10 students, descriptive and correlational design, regression analysis, Sto. Tomas, Davao del Norte, Philippines*

I. INTRODUCTION

Background of the Study

Despite the expanding importance of STEM areas, declining student enthusiasm in science has prompted academics to investigate factors impacting attitudes toward learning science (Bicer & Lee, 2019). In an era marked by growing knowledge in science, technology, and mathematics, decreased interest trickles down, impeding economic and societal progress (Evans et al., 2020). According to recent studies, students' interest in science and related topics has waned (Onah et al., 2020). Hence, a more positive environment for studying science is indispensable. Favorable attitudes toward science will mean educators can invest in the future by encouraging students to pursue careers in this critical field (Toma et al., 2019).

Research from different countries indicates disturbing trends. Indonesian junior high school students show disobedience and an aversion for the science assignment (Maison et al., 2021). In Bhutan, Karchun (2021) found a decline in favorable attitudes toward science among the older students while male students had a slightly higher level of positive attitude. Abed & Abu-Ali (2022) recorded a marked decline in positive attitude toward science among both sexes in Jordanian schoolchildren from fourth to eighth grade.

Robledo (2020) found that Filipino students face significant challenges in their pursuit of scientific knowledge, including difficulties with effort regulation. This suggests that students may struggle with distractions and concentration, hindering the translation of positive attitudes into practical skill development. Limited participation of students from non-A sections in school science activities, such as quiz bees and science investigatory project presentations, in one of Davao del Norte Division's public secondary schools raises concerns about learning attitudes across different academic tracks. Further evidence of disengagement includes high rates of student loitering during science classes; a significant 45% decline in class engagement among STEM students; and low student compliance with class requirements. This suggests a potential lack of confidence in their scientific abilities, hindering active participation in classroom discussions and problem-solving.

Positive teacher-student relationships, characterized by effective communication, trust, and a nurturing environment, significantly enhance learning attitudes and academic outcomes (Ma et al., 2021; Paschal & Mkulu, 2021). This study investigates the influence of teacher-student relationships and academic emotions on students' learning attitudes in science.

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Declining student interest in science necessitates research beyond traditional instruction (Tanghal, 2020; Mirana, 2019). While research on innovative pedagogies like game-based learning (Kalogiannakis et al., 2021) is valuable, it often overlooks the broader impact on student learning experiences. This study addresses this gap by investigating how existing attitudes toward science interact with teacher-student relationships and academic emotions. By exploring these interconnected factors, we aim to develop more effective strategies to foster positive learning attitudes and encourage future generations to pursue STEM careers.

This study aims to enhance students' attitudes towards science learning. By investigating the impact of teacher-student relationships and academic emotions, this research provides valuable insights for students and educators. Findings will be disseminated to educational institutions and presented at academic forums to contribute to the growing body of knowledge in science education.

This study aims to disseminate findings to educational institutions through research journals, social media presentations, and presentations at national and international forums. Findings will also be shared through the DepEd's Science and Math Enhancement Program (SMEP), School Learning Action Cell (LAC) sessions, and institutional science seminars.

II. OBJECTIVES

This study aimed to investigate the level of teacher-student relationship and academic emotions and its influence in the learning attitude of students in science among junior high school students in the public secondary schools in the Division of Davao del Norte for SY 2024-2025.

Specifically, this study sought to answer the following:
1. What is the extent of teacher-student relationship in terms of;
1.1 satisfaction;
1.2 instrumental help; and
1.3 conflict?
2. What is the level of academic emotion of students in terms of;
2.1 enjoyment;
2.2 hope;
2.3 pride;
2.4 anxiety;
2.5 shame; and
2.6 frustration?
3. What is the level of learning attitude of students in science in terms of;
3.1. keenness to learn science;
3.2 enjoyment in science learning;
3.3 disinterest; and
3.4 teacher interaction?
4. Is there a significant relationship between:
4.1 teacher-student relationship and learning attitude of students in science and;
4.2 academic emotions and learning attitude of students in science?
5. Does teacher-student relationship and academic emotions significantly influence the learning attitude of students in science?

III. METHODOLOGY

Research Design

This study employed a quantitative, descriptive-correlational approach. Quantitative research involves collecting and analyzing numerical data (Broadbent, 2017). This approach, often used in language learning research (Nassaji, 2015), describes a phenomenon without manipulating variables.

This study utilized a correlational design with multiple regression analysis to investigate the relationship between teacher-student relationships, academic emotions, and students' learning attitudes. Multiple regression analysis allows for examining how multiple independent variables (teacher-student relationships and academic emotions) influence a dependent variable (students' learning attitudes), determining the strength and direction of these relationships.

This approach is well-suited for assessing the extent to which teacher-student relationships and academic emotions influence students' learning attitudes toward science.

Research Respondents

Respondents in this study were 1,372 Grade 10 students enrolled for the 2024-2025 school year at four public high schools in Davao del Norte. A sample size of 301 was determined from a population size using the Online Raosoft Sample Size Calculator. Figure 1 shows a map highlighting Sto. Tomas, Davao del Norte.



Source: Google Maps. (n.d.). Google Maps. https://www.google.com/maps/@7.5335225,125.6204737,1625z.

Figure 1. Map of Sto. Tomas, Davao del Norte

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Research Instruments

Three research questionnaires, including Teacher Student Relationship Inventory (S-TSRI), Academic Emotions Scale (AES), and Attitude Towards Science Learning' (AtSL), were utilized to collect data from the respondents. These instruments underwent content validation by experts and pilot testing to ensure reliability. The S-TSRI, developed by Ang (2005), consists of 15 items to measure three distinct factors with Cronbach's alpha reliability coefficient of 0.848. Meanwhile, the revised version of AES created by Govaerts and Gregoir (2008), includes 28 items, assesses six primary emotions, with a Cronbach's alpha reliability coefficient of 0.862. Lastly, the revised version of AtSL created by Shah and Mahmood (2011) consists of 24 items assessing four main aspects, with a Cronbach's alpha reliability coefficient of 0.893.

Statistical Treatment

The following statistical techniques were used to examine and evaluate the collected data.relationship, academic feelings, and learning attitudes within science classrooms.

Mean. This statistical approach was used to determine the level of teacher-student

Pearson r Correlation. This tool was used to determine the correlation among the study variables.

Multiple Regression Analysis. This was used to explore how two independent variables affect the dependent variable.

IV. RESULTS

Table 1: Extent of Student's Teacher-Student Relationship

Items	SD	Mean	Descriptive Equivalent
Satisfaction			
1. I enjoy attending the class of my science teacher.	0.77	4.39	Very Highly Extensive
2. My relationship with my science teacher is positive.	0.83	4.30	Very Highly Extensive
3. If this teacher retires or leaves the school, I will miss him/her.	0.94	4.36	Very Highly Extensive
4. I am happy with my relationship with my science teacher.	0.78	4.47	Very Highly Extensive
5. I like this teacher.	0.73	4.64	Very Highly Extensive
Category Mean	**0.81**	**4.43**	Very Highly Extensive
Instrumental Help			
1. If I have a problem at home, I will ask my science teacher for help.	0.85	2.75	Moderately Extensive
2. I share about my personal life my science teacher.	0.94	2.35	Moderately Extensive
3. If I need help, I will go to my science teacher.	0.96	3.03	Moderately Extensive
4. If I need someone to listen to me, I will go to my science teacher	0.84	2.84	Moderately Extensive
5. I depend on my science teacher for advice.	0.58	3.12	Moderately Extensive
Category Mean	**0.83**	**2.83**	Moderately Extensive
			Extensive
Overall Mean	**0.84**	**3.84**	Highly Extensive

Table 1 shows the student-teacher relationship.

The highest mean was 4.43 which is satisfaction, categorized as very highly extensive, while the lowest mean was 2.83. The overall mean was 3.84, indicating highly extensive. Overall, the standard deviation for teacher-student connections was 0.84, showing substantial heterogeneity in students' evaluations of their interactions with their science teachers.

The findings are consistent with previous research, which emphasizes the importance of strong teacher-student interactions in generating relevant engagement, motivation, and academic success, as well as amicable ties with peers.

Fabris et al. (2022) and Afzal et al. (2023) present empirical evidence supporting the favorable results of such partnerships, which include higher student motivation, improved academic performance, stronger social skills, and better well-being. A strong and supportive relationship between teachers and students will improve students' motivation and attitude toward learning (Warren, 2021).

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Table 2: Level of Student's Academic Emotions

Items	SD	Mean	Descriptive Equivalent
Enjoyment			
1. I feel great when I study for the science exam.	0.93	4.06	High
2. I am pleased to work on science subjects to prepare for the exam.	0.95	3.98	High
3. I am pleased to be doing exercises to prepare for the science exam.	0.96	3.63	High
4. I am happy solving hard problems when I prepare the science exam.	0.90	3.35	Moderate
5. Because I enjoy preparing for the exam, I'm motivated to do more than is necessary.	0.97	3.65	High
Category Mean	**0.94**	**3.70**	High
Hope			
1. I feel optimistic about the preparation of the science exam.	0.95	3.44	High
2. I am sure that everything will go well at the science exam.	0.98	3.42	High
3. I am confident for the science exam when I see how I solve the exercises.	0.95	3.36	Moderate
4. I am optimistic when I think about the science exam.	0.98	3.28	Moderate
5. I have great hope that my abilities will be sufficient.	0.89	3.60	High
Category Mean	**0.95**	**3.42**	High
Pride			
1. I am proud of the way I am preparing for the science exam.	0.98	3.64	High
2. I feel proud thinking of somebody noticing the quality of my preparation for the science exam.	0.82	3.52	High
3. I feel proud when I do exercises with my science exam in mind.	0.88	3.73	High
Category Mean	**0.89**	**3.63**	High
Anxiety			
1. I feel anxious when I study for the science exam.	0.97	3.83	High
2. I get so nervous I wish I could just skip the science exam.	0.95	3.83	High
3. I am anxious if I could finish the exam on time.	0.93	3.32	Moderate
4. I feel anxious when I am doing exercises for the science exam.	0.90	3.73	High
Category Mean	**0.94**	**3.67**	High
Shame			
1. I feel ashamed thinking I might not have prepared for the science exam properly.	0.99	2.76	Moderate
2. I am ashamed when I cannot do exercises for preparing the science exam.	0.98	2.88	Moderate
3. I am ashamed of the poor quality of my preparation for the science exam.	0.97	2.71	Moderate
4. I feel ashamed not having started preparing the science exam earlier.	0.94	2.72	Moderate
5. I feel ashamed thinking about how embarrassing it would be to fail the science exam.	0.90	2.44	Low
Category Mean	**0.96**	**2.70**	Moderate
Frustration			
1. I am bored studying for the science exam.	0.98	3.92	High
2. When I am preparing for the science exam, I feel weary.	0.98	3.67	High
3. I feel frustrated doing exercises for the science exam.	0.97	3.85	High
4. The science subjects I have to study for the exam irritate me.	0.96	4.08	High
5. When I am sitting at my desk for a long time preparing for the science exam, I can throw my notes through the window.	0.99	4.31	Very High
6. I feel irritated when doing exercises for preparing the science exam.	0.98	4.08	High
Category Mean	**0.98**	**3.98**	High
Overall Mean	**0.94**	**3.52**	High

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Table 2 shows students' academic emotion. Among the emotions assessed, frustration received the highest average score of 3.98, which falls into the "high" category. However, due to the reverse coding of the items, this indicates low levels of student frustration. The average standard deviation of 0.94 indicates a degree of variability in students' individual experiences. Overall, the mean score for all academic emotions was 3.52, categorized as "high."

These findings align with previous research. Yeo and Ong (2024) found that positive emotions like interest, curiosity, and enjoyment enhances student motivation and performance. This supports student feedback, which highlighted enjoyment, hope, and pride in learning. Pekrun (2024) further underscores the crucial role of positive emotions, such as enjoyment, hope, and pride, in enhancing student motivation, engagement, and ultimately, academic achievement.

Table 3: Level of Student's Leaning Attitude in Science

Items	SD	Mean	Descriptive Equivalent
Keenness to Learn Science			
1. I follow a regular schedule to study science subject(s) at home.	0.93	3.61	High
2. I understand science lessons taught by the teacher in the class.	0.89	4.07	Very High
3. I can focus on the science lesson during the whole class.	0.95	3.74	High
4. I rewrite the science lesson daily at home.	0.93	3.40	High
5. I complete the science homework before going to play.	0.92	3.86	High
6. During science lectures, I comprehend important points.	0.98	3.79	High
7. While studying science class, I fully concentrate on the topic.	0.97	3.80	High
8. I can explain science lessons in my own words.	0.98	3.34	Moderate
9. I usually relate the previously learned lessons with new science lessons.	0.92	3.69	High
Category Mean	**0.94**	**3.70**	High
Enjoyment in Science Learning			
1. I like to learn science because it is an interesting subject.	0.95	4.16	High
2. I feel real pleasure in science class.	0.91	3.60	High
3. I usually allocate most of the time to the subject of science as I like it more than other subjects.	0.93	3.47	High
4. My desire to attain success in science subject, urges me for more hard work	0.90	3.70	High
5. I enjoy learning science lessons	0.74	4.33	Very High
Category Mean	**0.89**	**3.84**	High
Disinterest			
1. Science lessons become a source of boredom for me.	0.82	4.06	High
2. The lessons taught in science classes are not interesting.	0.86	4.29	Very High
3. I can't understand the science lessons after the class.	0.83	4.19	High
4. I don't find it interesting to discuss science topics after the school time.			
5. I don't take interest to complete my homework of science subject(s).	0.87	4.32	Very High
Category Mean	**0.84**	**4.23**	Very High
Teacher Interaction			
1. Whenever I want to ask anything about science subject, I immediately consult the teachers.	0.93	3.52	High
2. For any topic(s) that I can't understand during the science class, I consult the teacher.	0.98	3.55	High
3. The important point that teacher explain during teaching, help me in learning.	0.96	4.01	High
4. In the following classes, I would prefer to take a science subject.	0.94	3.59	High
5. My science teacher encourages me to learn more science when I consult him or her.	0.95	3.82	High
Category Mean	**0.95**	**3.70**	High
Overall Mean	**0.91**	**3.88**	High

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Table 3 shows the students' learning attitude in science. The highest mean was 4.23, indicating very high. However, due to reverse coding, this indicates a very low level of disinterest in science. The lowest mean was 3.70, indicating a high level of motivation and engagement in science learning. The overall standard deviation of 0.91 indicated fairly low. The overall mean was 3.88, indicating a high overall attitude towards learning science.

These results are in line with Simamora et al. (2020), which note the increasing focus on promoting positive student attitudes toward science, in addition to teaching scientific content learning environment that not only teaches scientific knowledge but also nurtures a passion for scientific inquiry. Astalini et al. (2019) present empirical evidence supporting the important influence of attitudes on students' academic performance. Limeri et al. (2020) explain this relationship further, suggesting that students with positive attitudes toward learning tend to be more diligent in their studies, which results in better academic performance.

Table 4: Significance of the Relationship Between Variables

Variables Correlated	r-value	p-value	Remarks
Teacher-Student Relationship and Learning Attitudes of Student in Science	0.330	0.000	Significant
Academic Emotions and Learning Attitude of Students in Science	0.586	0.000	Significant

Table 4 reveals a significant positive correlation between teacher-student relationships (r = 0.330) and students' learning attitudes in science, suggesting that improved relationships foster more positive attitudes. A strong positive correlation (r = 0.586) was also found between academic emotions and learning attitudes, indicating that positive emotions (enjoyment, hope, pride) during science lessons enhance positive attitudes towards the subject. These findings emphasize the crucial role of positive teacher-student interactions and academic emotions in shaping students' overall science experiences.

This study supports the crucial role of teachers in shaping the future (Ekechikwu & Ifeanyichukwu, 2021). Strong teacher-student relationships foster student self-esteem, positive learning attitudes, and a willingness to take academic risks (Coristine et al., 2022; Thornberg et al., 2020)
Furthermore, positive emotions, including interest, curiosity, and enjoyment, significantly influence student engagement, motivation, and academic achievement (Lei et al., 2018; Hendrix, 2019). Positive emotions enhance the learning experience and foster a positive disposition towards learning, while negative emotions hinder focus, performance, and overall learning experience (Zeng et al., 2017).

Table 5: Influence of Teacher-Student Relationship and Academic Emotions on Learning Attitudes of Students in Science

Independent Variable	Unstandardized Coefficients		Standardized Coefficients	t	p-value	Remarks
	B	Std. Error	Beta			
(Constant)	0.816	0.234		3.484	0.001	
Teacher-Student Relationship	0.216	0.047	0.214	4.602	0.000	Significant
Academic Emotions	0.631	0.054	0.540	11.615	0.000	Significant
R = 0.622;		R^2= 0.386;		F= 93.853		p= 0.000

The regression analysis revealed that both teacher-student relationships and academic emotions significantly influenced learning attitudes ($p < 0.05$). A one-unit increase in teacher-student relationship was associated with a 0.216-unit increase in learning attitudes, and a one-unit increase in academic emotions was associated with a 0.631-unit increase in learning attitudes, indicating a significant positive relationship between these variables and learning attitudes. Collectively, teacher-student relationships and academic emotions accounted for 38.6% of the variance in learning attitudes.

The analysis revealed that two variables, teacher-student relationships and academic emotions, significantly predict students' learning attitudes. This means that changes in these variables are associated with changes in students' attitudes towards science. In a classroom context, whenever the teacher offers personalized attention and reassurance on the students who are anxious and struggling in the lesson's activity, they foster a sense of trust and understanding.

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The teacher's encouragement and positive feedback helped shift students' emotions. As they started to see positive results, they experienced a sense of accomplishment and pride, replacing their initial anxiety with excitement and curiosity. Due to the strong teacher-student relationship and positive emotional climate, the students would likely successfully complete the given task. This positive experience reinforced their positive attitude towards science.

As can be seen from Table 5, the results support Darling-Hammond's (2017) assertion on the importance of teacher education in equipping teachers to establish positive relations with students and construct an appropriate learning environment. The findings of this study are as follows: the right teaching skills for the teacher will create good bonds between the teacher and the student, making them feel at home, and provide the needed support. Coristine et. al., (2022) and Thornberg et. al., (2020) emphasize how important good teacher-student relationships are to foster in students' motivation, engagement, and well-being. Hattie (2017) observes that such relationships make them feel they belong, trust their teachers, and get support; therefore, they enhance student engagement coupled with academic success. With a focus on building excellent relationships between the teachers and their students, teachers can create superior learning environments and enhance students' outcomes. This research highlights how important strong relationships between teachers and students are for creating good learning environments in science. These relationships help students feel like they belong, trust their teachers, and stay motivated. This encourages students to participate more, try new ideas, and believe in themselves. Good relationships with teachers, along with positive feelings about school like enjoyment, curiosity, hope, and pride, work together to improve learning results. Engaging activities, supportive feedback, and a positive classroom culture all contribute to fostering a more effective and enjoyable learning experience, ultimately cultivating a genuine passion for scientific inquiry.

RECOMMENDATIONS

This study recommends several strategies to enhance student learning attitudes in science. Students should prioritize building strong teacher relationships, cultivating positive emotions during learning, and actively engaging in learning activities. Teachers should foster rapport, elicit positive emotions through engaging instruction, and provide differentiated support. School administrators should integrate study findings into Learning Action Cell (LAC) sessions, conduct workshops for teachers, and develop evidence-based teaching strategies. DepEd officials can play a crucial role by investing in teacher training, improving working conditions, and promoting teacher well-being. Future research should explore the longitudinal effects of these factors and utilize qualitative methods to gain deeper insights into student perspectives.

CONCLUSIONS

The study found that students exhibited high levels of teacher-student relationships, academic emotions, and positive learning attitudes toward science. Significant positive correlations were observed between teacher-student relationships and learning attitudes, and between academic emotions and learning attitudes. Moreover, both teacher-student relationships and academic emotions significantly predicted students' learning attitudes in science.

REFERENCES

1. *Abed, O., & Abu-Ali, M. (2022). Attitudes of Fourth and Eighth Grade Jordanian Students toward Science:A Cross-Sectional Study. Zenodo (CERN European Organization for Nuclear Research). https://doi.org/10.5281/zenodo.7117638*
2. *Afzal, A., Rafiq, S., & Kanwal, A. (2023). THE INFLUENCE OF TEACHER-STUDENT RELATIONSHIPS ON STUDENTS' ACADEMIC ACHIEVEMENT AT UNIVERSITY LEVEL. Gomal University Journal of Research, 39(01), 55–68. https://doi.org/10.51380/gujr-39-01-06*
3. *Astalini, A., Kurniawan, D. A., Pathoni, H., Kurniawan, W. A., Jufrida, J., Kurniawan, D. A., & Perdan, R. (2019). Motivation and attitude of students on physics subject in the middle school in Indonesia. International Education Studies, 12(9), 15. https://doi.org/10.5539/ies.v12n9p15*
4. *Bicer, A., Lee, Y., Capraro, R. M., Capraro, M. M., Barroso, L. R., & Rugh, M. (2019). Examining the effects of STEM PBL on students' divergent thinking attitudes related to creative problem solving. 2021 IEEE Frontiers in Education Conference (FIE). https://doi.org/10.1109/fie43999.2019.9028431*
5. *Broadbent, J. (2017). Comparing online and blended learner's self-regulated learning strategies and academic performance. The Internet and Higher Education, 33, 24–32. https://doi.org/10.1016/j.iheduc.2017.01.004*
6. *Coristine, S., Russo, S., Fitzmorris, R., Beninato, P., & Rivolta, G. (2022, April 1). The importance of Student-Teacher relationships. Pressbooks. https://ecampusontario.pressbooks.pub/educ5202/chapter/the-importance-of-student-teacher-relationships/*
7. *Darling-Hammond, L., Flook, L., Schachner, A., Wojcikiewicz, S., Cantor, P., & Osher, D. (2022). Educator learning to enact the science of learning and development. https://doi.org/10.54300/859.776*
8. *Ekechukwu, P. C. & Ifeanyichukwu, J. M. (2020). Principal-Staff Relationship For Effective Secondary Schools Administration In South-South Geo-Political Zone Of Nigeria. International Journal of Progressive Sciences and Technologies (IJPSAT)*
9. *Evans, C., Zhu, X., Winstone, N., Balloo, K., Hughes, A., & Bright, C. (2019). Maximising student success through the development of Self-Regulation. Office for Students ABSS Report (L16). Southampton, University of Southampton. https://research-repository.griffith.edu.au/handle/10072/393931*
10. *Fabris, M. A., Roorda, D., and Longobardi, C. (2022). Editorial: student-teacher relationship quality research: past, present and future. Front. Educ. 7:1049115. doi: 10.3389/feduc.2022.1049115*
11. *Hattie, J., 2017. The research of John Hattie: visible LearningPlus 250+ influences on student achievement. Melbourne, VIC: Corwin.*
12. *Hendrix, E (2019). How your surroundings affect the way you study. https://www.ucas.com/connect/blogs/how-your-surroundings-affect-way-you-study*
13. *Kalogiannakis, M., Papadakis, S., & Zourmpakis, A. (2021). Gamification in Science Education. A Systematic Review of the literature. Education Sciences, 11(1), 22.*

ISSN (Online): 2455-3662
EPRA International Journal of Multidisciplinary Research (IJMR) - Peer Reviewed Journal
Volume: 11| Issue: 1| January 2025|| Journal DOI: 10.36713/epra2013 || SJIF Impact Factor 2024: 8.402 || ISI Value: 1.188

https://doi.org/10.3390/educsci11010022

14. *Karchung (2021). Student's Attitude towards Science Learning in Lower Secondary School under Tashi Yantse Dzongkhag. Science Archives, Vol. 2 (3), 227-237. http://dx.doi.org/10.47587/SA.2021.2313*
15. *Lei, H., Cui, Y., & Chiu, M. M. (2018). The Relationship between Teacher Support and Students' Academic Emotions: A Meta-Analysis. Frontiers in Psychology, 8. https://doi.org/10.3389/fpsyg.2017.02288*
16. *Limeri, L. B., Carter, N. T., Choe, J., Harper, H. G., Martin, H. R., Benton, A., & Dolan, E. L. (2020). Growing a growth mindset: characterizing how and why undergraduate students' mindsets change. International Journal of STEM Education, 7(1). https://doi.org/10.1186/s40594-020-00227-2*
17. *Ma, L., Liu, J., & Li, B. (2021). The association between teacher-student relationship and academic achievement: The moderating effect of parental involvement. Psychology in the Schools, 59(2), 281–296. https://doi.org/10.1002/pits.22608*
18. *Maison, M., Kurniawan, D. A., & Zain, M. S. (2021). Students' Attitudes in science Learning: Comparison between public and private junior high schools. Journal of Education Research and Evaluation, 5(4), 568. https://doi.org/10.23887/jere.v5i4.34368*
19. *Mirana, V. (2019). Attitude towards Science and Process Skills of Junior High School Students. Social Science Research Network. https://doi.org/10.2139/ssrn.3389072*
20. *Nassaji, H. (2015). Qualitative and descriptive research: Data type versus data analysis. Language Teaching Research, 19(2), 129–132. https://doi.org/10.1177/1362168815572747*
21. *Onah, E. N., Ugwuanyi, C. S., Okeke, C. I., Nworgu, B. G., Agwagah, U. V., Ugwuanyi, C. C., Obe, P. I., Nwoye, M. N., & Okeke, A. O. (2020). Evaluation of the Impact of Computer-Assisted instruction on Mathematics and Physics Students' achievement: Implication for Industrial Technical Education. International Journal of Engineering Research and Technology, 13(7), 1786. https://doi.org/10.37624/ijert/13.7.2020.1786-1794*
22. *Paschal, M. J., & Mkulu, D. G. (2021). Teacher-Students' Relationship and Students' Academic Performance in Public Secondary Schools in Magu District, Tanzania. Journal of Research in Education and Society, Volume 11, Number 1(ISSN: 2141-6753). https://doi.org/10.31730/osf.io/tmh9c*
23. *Pekrun, R. (2024). Control-Value Theory: from achievement emotion to a general theory of human emotions. Educational Psychology Review, 36(3). https://doi.org/10.1007/s10648-024-09909-7*
24. *Robledo, R. (2020). Students' Attitudes toward Science in Relation to Science Achievement. ResearchGate. https://doi.org/10.21275/ART2019804*
25. *Simamora, R. E., Sidabutar, D. R., & Surya, E. (2017). IMPROVING LEARNING ACTIVITY AND STUDENTS' PROBLEM-SOLVING SKILL THROUGH PROBLEM BASED LEARNING (PBL) IN JUNIOR HIGH SCHOOL. International Journal of Sciences: Basic and Applied Research, 33(2), 321–331. http://digilib.unimed.ac.id/24792/*
26. *Tanghal, A. B. (2020). IGC: A Play-based Approach to Improve Concept and Operations on Integers. ASEAN Multidisciplinary Research Journal, 6. Retrieved from https://www.paressu.org/online/index.php/aseanmrj/article/view/259*
27. *Thornberg, R., Forsberg, C., Chiriac, E. H., & Bjereld, Y. (2020). Teacher–Student Relationship Quality and Student Engagement: A Sequential Explanatory Mixed-Methods study. Research Papers in Education, 37(6), 840–859. https://doi.org/10.1080/02671522.2020.1864772*
28. *Toma, R. B., Greca, I. M., & Gómez, M. L. O. (2019). Attitudes towards science and views of nature of science among elementary school students in terms of gender, cultural background and grade level variables. Research in Science & Technological Education, 37(4), 492–515. https://doi.org/10.1080/02635143.2018.1561433*
29. *Warren, L. L. (2021). The importance of teacher leadership skills in the classroom. Education Journal, 10(1), 8. https://doi.org/10.11648/j.edu.20211001.12*
30. *Yeo, G. C., & Ong, D. C. (2024). Associations between cognitive appraisals and emotions: A meta-analytic review. Psychological Bulletin. https://doi.org/10.1037/bul0000452*
31. *Zeng, Q., Qi, S., Li, M., Yao, S., Ding, C., & Yang, D. (2017). Enhanced conflict-driven cognitive control by emotional arousal, not by valence. Cognition and emotion, 31(6), 1083-1096. Robinson, C. L. (2012). Mathematics lecturing in the digital age. International Journal of Mathematical Education in Science and Technology, 43(6), 703-716.*