

The Attitude of Grade Seven to Ten Students Toward Learning Science: A Comparative Study Based on Level and Gender

Deepak Raj Chetri¹, Gaki Wangmo², Sujata Baraily³, Rajesh Gurung⁴, Choney Duba⁵, Sonam Choden⁶, and Manoj Kumar⁷

¹Department of Science, Phuentsholing Middle Secondary School (PMSS), Ministry of Education, Bhutan.

²Department of Science, PMSS, Ministry of Education, Bhutan: ORCID ID: 0000-0002-31253129

³Department of Science, PMSS, Ministry of Education, Bhutan: ORCID ID:0000-0002-8945-2809

⁴Department of Science, PMSS, Ministry of Education, Bhutan: ORCID ID:0000-0002-0222-2008

⁵Department of Science, PMSS, Ministry of Education, Bhutan: ORCID ID:0000-0002-4311-8493

⁶Department of Science, PMSS, Ministry of Education, Bhutan: ORCID ID:0000-0002-7025-1441

⁷Department of Science, PMSS, Ministry of Education, Bhutan: ORCID ID:0000-00001-5491-2361

Abstract: Students' interest in learning a particular subject depends on their love for the subject and in turn, their interest is determined by their attitude towards the subject. A quantitative study on the attitude of grade seven to ten students toward learning science subjects was conducted in Phuentsholing Middle Secondary School, Bhutan to evaluate and implement necessary interventions if they possess any negative attitudes and to enhance their belief towards science further if students are with a positive attitude. The study adopted a survey research design, where 16 questions were distributed among four constructs; school factors, outside-school factors, future scope related to science, and attitude toward science. SPSS20 and Microsoft Excel 2013 were used to analyze data using descriptive analysis, paired t-test, ANOVA, and multiple regression to test hypotheses. The results indicated a high positive attitude of students towards science with no significant gender difference. There was no significant variation in responses among the different grades. School factors were found to be a major (61%) influencing factor for the attitude of students to learn science followed by future scope related to science (40%) while learning of science outside school (17%) contributed the least. All the factors were found significant at $P < 0.05$, $R^2 = 62.3\%$. Recommendations are derived from the findings further to enhance the attitude of students toward learning science subjects.

Keywords: Attitude, Grades, Learning, Science subjects, Students.

INTRODUCTION

Attitude is defined as positive or negative feelings expressed by a person towards a certain subject (Osborne, 2003). A person with a positive attitude towards the subject is more likely to dedicate their time and effort ultimately leading to enhanced performance in the subject while negative attitude towards the subject may develop dislike causing negligence and hatred for the subject. It has, therefore, become essential for science teachers to study the attitude of classes seven to ten students and understand their perceptions towards learning science subjects.

Bhutan a small developing country located between India and China has imposed the highest priority on education as it is understood as an important attribute of developmental progression. Science Education is an inevitable instrument in mapping human understanding and progressive development. Thus, the Royal Government of Bhutan has given great importance to institutionalizing science education across the class levels. Various studies were conducted to validate the content as part of the major Bhutanese science curriculum reform prioritized in the 10th Five-Year Plan (2008-2012). It was intended to provide a research-informed perspective for science

curriculum development. Certain challenges and issues were identified through those studies however, it is still observed certain fragments of students find science subjects difficult. Therefore, this study aims to derive the attitude of students toward learning science.

His Majesty the Fifth King has coined the Bhutanese Education system's aim as producing 'Globally Competent and Nationally Rooted' citizens. The Ministry of Education is geared toward producing knowledgeable students. Science education enables students to develop an understanding of their surroundings and helps them in developing a sense of belongingness. It opens a window to explore and develop the mindsets in enhancing the perception without compromising their surroundings whereby, they will be prepared to accommodate themselves in the worldly atmosphere and embrace their root as the nation ventures into using new technology on daily basis.

Technology has come as a boon for the education sector in many countries where teachers had the potential to use technology to teach (Nidup, 2022) abstract concepts of science. With the decline in the number of students opting for science

(Osborne, Simon, & Collins, 2003) it has become crucial for teachers and researchers to study and understand the attitude of students toward science to motivate them so that they develop an interest in learning science (Chetri, 2022). Studying the factors impacting the attitude of students toward learning will act as a pointer to understanding and solving problems (Osborne, Simon & Collins, 2003).

The study evaluates the attitude of students in grades seven to ten toward learning science subjects and have some interventions based on the findings of the study if the learning attitude of students is poor or negative. The gender difference and variation of perception of science across the levels under study is observed to come up with necessary recommendations to motivate students to foster a better positive attitude in students to keep their interest in learning science subjects alive.

RESEARCH QUESTIONS

1. What is the attitude of grades seven to ten students toward learning science subjects?
2. Is there a gender difference in the learning attitudes of students toward learning science?
3. Do attitudes of students toward science vary based on the level?
4. Which factor among the school factors, outside school factors, and future scope related to science has the greater influence on the attitude of students toward learning science?

LITERATURE REVIEW

Attitude is considered one of the detrimental factors in academic achievement. Therefore, problems related to the learning attitude of students toward science have been a mutual worry for most countries (Taiwo, Ukamaka, & Abdallah, 2021). Oroujlou and Vahedi, (2011) defined attitude as a set of beliefs in a situation, things, events, or an environment persuading one to respond desirably. The mindset of people is based on the belief system that they are fed with since their birth. Osborne, Simon, and Collins, (2003) believe in the importance of inculcating a positive attitude towards science, scientists, and particularly learning science subjects as an important component of education. The attitude of learners will matter in all aspects of learning it is therefore the work of science educators to understand the attitude of students toward science and further influence positive attitude (Taiwo, Ukamaka, & Abdallah, (2021).

Many studies have been performed globally to evaluate the attitude of students towards learning science with a variety of findings. Anwar and Bhutta, (2014) in their study with 1458 students found a positive attitude of students toward learning science with no significant variation among the province selected. Similarly, grade ten students of Phuntshothang School in Bhutan possessed a significant positive attitude toward learning physics with personal interest, particularly in problem-solving and the ability of students to link the concept of physics to the real world (Chetri, 2022). Furthermore, Sethi, (2015) found a significant difference in learning attitude between urban and rural schools with urban students possessing a more favorable attitude compared to the rural students although the socio-economic status of the learners did not affect their attitude towards science. Tanti, *et al.*, (2020) also in their study found a significant positive attitude of students toward learning science with the social implication of science and pleasure to learn science influencing the attitude of the students toward science. Anwar, Hasan, and Baderan, (2022) claimed to have a significant correlation of 0.675 between online learning and the learning interest of students in biology. They also found the learning interest of students to be better when teachers designed better lessons to teach biology online. Similarly, Perdana and Maison, (2022) found 65% of students from a total of 139 respondents to possess a very high attitude toward learning science. Many students were of the attitude that science is all about understanding concepts, explaining, and working to make others' lives better and that was considered to be the job of scientists, while, they themselves did not want to be a scientist (Saputra & Tania, 2022).

On contrary, studies also found their respondents to possess a negative attitude toward science (Astalini, *et al.*, 2019; Villa & Candeias, 2020) with no gender difference (Sethi, 2015). Similarly, Nidup, *et al.*, (2021) found students to possess a negative attitude towards chemistry expressing chemistry to be a boring and difficult subject.

There are several possible factors affecting the attitude of students toward learning science. Anwar and Bhutta, (2014) posited active engagement of students in learning science to sustain their positive attitude towards learning science. Process skills of learning science influence the attitude of students towards learning science, where scientific process skills of 64.3% of the 139 students they surveyed were found to be

very good and they also claimed that process skills of science can be enhanced through practice and training students through practical lessons and experiments. Similarly, Le and Do, (2021) claimed the attitude of students toward science to be influenced by six factors that are, career prospects, learning needs, school factors, learners' capacity, and family factors. The attitude of students toward scientific inquiry, classroom enjoyment, students' interest in learning science, and personal interest were some of the predictors of academic achievements in physics, among which classroom enjoyment was a major contributing factor impacting students' achievement in science (Ali & Awan, 2013). Classroom environment, the relevance of curriculum, teachers' behavior, perceived difficulty, and self-directed effort were studied among which, student factors and classroom environment factors needed to be controlled to improve the positive attitude of students towards science (Musengimana, Kampire, & Ntawiha, 2020) as classroom environment was found dominant factor in influencing the attitude of students toward learning science (Taiwo, Ukamaka, & Abdallah, 2021). Tanti, *et al.*, (2020) on the other hand studied the attitude of students based on three factors; the social implication of science, the pleasure of learning science, and attitude towards science investigation and found these factors to be related to each other. Attitude toward science was greatly influenced by the practice of involvement (Anghelache, 2013) through cooperative teaching strategies which further showed a positive implication of constructivist teaching on students understanding of science concepts to have a close relation to social interactions or cooperation (Fulmer, Ma & Liang, 2019). Papanastasiou and Papanastasiou, (2004) claimed classroom teaching to have a direct effect on the attitude of students towards learning science among other factors such as school climate, educational background, and aspirations of parents. Ozden, (2008) claimed valid training for science teachers to influence students' attitudes to learn science. Students who attended transformed courses developed a higher positive attitude than students who attended traditional courses (Duncan & Arthurs, 2012).

Prevalence of gender difference was the other area under the lens of researchers. Ozden, (2008) found a significant gender difference in attitude towards

learning science with male students possessing a higher positive attitude compared to female students. Chetri, (2022) found a significant gender difference in problem-solving where male students had a higher positive attitude than females in problem-solving and gender difference was not significant in liking physics to the real world.

With a majority of findings supporting classroom environment and teachers factors to have a major influence, teachers' aptitude in content and pedagogy were key factors in enhancing students' attitude toward learning science (Das, Faikhamta, & Punsuvon, 2018), further teachers are recommended to improve classroom management skills (Taiwo, Ukamaka, & Abdallah, 2021). Although many studies have been conducted to understand the attitude of students towards science in other countries, there are limited studies conducted in our country and this is the first study of its kind in Phuentsholing Middle Secondary School. Therefore it was found crucial to study and examine the attitude of students toward science and the factors associated with it to have necessary interventions.

METHOD

The study adopted a quantitative research method as it was found suitable, having to interpret and analyze the views of the respondents using numbers. A survey research design was used to collect the perceptions of the student participants.

RESEARCH INSTRUMENTS

The constructs for the study were adopted from the works of Anwar and Bhutta (2014); Perdana, Asrial, and Maison (2022). The questionnaires were designed by all the science teachers, while, a few questions were also adopted from the works of Taiwo, Ukamaka, and Abdallah, (2021). The survey questionnaires were developed using a 5-Point Likert scale with 1= strongly disagree, 2= disagree, 3= moderately agree, 4= agree, and 5= strongly agree. The survey questionnaires developed were given to 30 students randomly selected from classes seven to ten for pilot testing to further validate the items. The value of Cronbach's alpha of 0.87 was obtained indicating high internal consistency among the questionnaire. Value of Cronbach's alpha for each group of items are represented in table 1.

Table 1: Distribution of items and Cronbach's alpha for each construct

Constructs	Number of items	Cronbach's Alpha
1. School factors	4	0.74
2. Outside school factors	3	0.77
3. Future Scope of science	4	0.76
4. Attitude toward Science	5	0.85
All items together	16	0.87

DATA COLLECTION AND ANALYSIS

Data collected using a google form were analyzed using SPSS 20 and Microsoft Excel 2013. Frequencies and percentages were used to represent the sample and total populations. Descriptive statistics, mean and standard deviation were used to describe the data collected. One-way ANOVA was used to compare the variation of responses between four different levels of students. T-test was used to test the significance of gender difference. Multiple regression analysis was performed to find out the significance and level of influence of school factors, outside school factors, and future scope related to science toward the attitude of students in learning science and to provide recommendations.

Sampling

Purposive sampling was employed for the study as the aim of the study was to collect the views of all the students of classes seven to ten, learning the science curriculum. It was, therefore, essential to include all students to get reliable data. The survey questionnaires were floated to all the 335 students in grades seven to ten but only 314 students responded to the questionnaires in about a week. There were (N=115) 36.6% of them from class ten, (N=98) 31.2% from class nine, (N=47) 15% from class eight, and (N=54) 17.2% from class seven among which (N=143) 45.5% were male and (N=171) 54.5% female students. The details sampling are represented in the table 2A and B.

Table 2: views of all the students of classes seven to ten

A: sample based on grades			B: samples based on gender		
Grades	Number	Percent	Gender	Number	Percent
Class X	115	36.6	Male	143	45.5
Class IX	98	31.2			
Class VIII	47	15.0	Female	171	54.5
Class VII	54	17.2			
	314	100.0		314	100

FINDINGS

Descriptive analysis was used to find out the mean and standard deviations for each item of the

questionnaires and the average of each item is represented in table 3.

Table 3: Result of Descriptive analysis for each group of items

Items/ Constructs	Mean	SD	Level
1. Learning science in school (school factors).	3.7	1.0	High
2. Learning science outside school factors (Self-interest)	3.2	1.2	Moderate
3. Future scope related to science.	4.2	1.0	High
4. Attitude of students toward learning science	3.6	1.0	High

The first set of questions under the learning of science in school had four items where students agreed (with $M=3.7\pm 1.0$) that they enjoy science lessons at school, they understand the concepts of science when taught by teachers, science lessons get more interesting with experiments, and that they love science because of their teachers. The second set of questionnaires was to get the perception of students on whether they learn science outside schools out of curiosity. The

respondents moderately agreed (with $M=3.2\pm 1.2$) that they spend a little amount of time or only a group of students spend time learning science outside school. The respondent agreed with the highest mean ($M=4.2\pm 1.0$) that science has plenty of future scopes, it is important to learn science subjects, and those who are good at science subjects will have more job opportunities in the future. The final set of questionnaires was meant to evaluate the attitude of students toward learning

science, where respondents shared their perceptions stating a high positive attitude (with $M=3.6\pm 1.0$) that they like learning science subjects, they learn science subjects with fun, they feel curious to learn about science, and learning science enhances their creativity. An alternative hypothesis was accepted as the findings showed a

high positive attitude of students in grades seven to ten toward learning science.

A paired T-test for two sample means assuming unequal variance was conducted to find out the significance of gender difference among all four areas of studies.

Table 4: T-test for difference in attitude toward science based on gender

Themes / Constructs	Male (M)	Female (M)	P value	Significance
1. School factors	3.7	3.5	0.001	Significant
2. Outside school factors	3.16	3.16	0.99	Not significant
3. Future scope related to science	4.1	4.2	0.25	Not significant
4. Attitude toward science	3.6	3.6	0.86	Not significant

The gender difference was significant under school factors where male students had a higher positive attitude ($M=3.7$) compared to female students ($M=3.5$) at $P<0.05$ stating that classroom learning is useful in enhancing their attitude toward learning science and that they enjoy classroom teaching. There was no significant gender difference in their perception of future scopes related to science and their attitude toward learning

science. Findings suggest accepting the null hypothesis that there is no gender difference in attitude toward science.

The one-way ANOVA was used to determine the significance of the difference between means of responses based on the four different levels, class VII, class VIII, class IX, and class X, details of which are represented in table 5.

Table 5: Variance of responses among the levels (classes seven to ten).

Sources of variance	Group wise average					Significance at P = 0.05	
	VII	VIII	IX	X	F	P-value	F critical
1. School factor	3.9	3.5	3.7	3.7	1.91	0.128	2.633
2. Outside school factor	3.4	3.5	3.2	2.8	7.23	0.000	2.633
3. Future scope of science	4.1	4.3	4.1	4.1	0.81	0.491	2.633
4. Attitude toward science	3.7	3.6	3.6	3.6	0.53	0.659	2.633

Although there was a slight variation in the means of school factors among the four groups with class VII obtaining the highest mean ($M=3.9$) and class VIII with the lowest mean (of $M=3.5$), the difference among the group is not significant as $P>0.05$, moreover $F\text{-value}>F\text{-critical}$. For the outside school factors, there was a significant variation of responses among different classes. Students of classes VII, VIII, and IX agreed (with $M=3.4$, 3.5 , and 3.2) respectively significant at $P<0.05$ that they learn science outside school, whereas students of class X moderately agreed (with $M=2.8$, $P<0.05$) that they spend adequate time at home, learning science, watching science experiments and learning science concepts on the YouTube. From the result, we can conclude that class X students spend the least time learning science at home compared to the other groups.

There was no significant difference in the views of respondents ($P>0.05$) toward the importance of science and its future scope. A majority of the students believe that learning science is important and there is a lot of future scope for those students

who learn science, moreover future job is secured for those who perform academically well in science. The fourth set of questionnaires was to evaluate the attitude of students toward learning science, where no significant variance in the views was observed indicating that all groups had an equally positive attitude toward learning science subjects. The findings suggested no difference in the attitude of students toward learning science therefore researchers failed to reject the null hypothesis.

Table 6 represents the result of multiple regression to see the significance of the dependence of attitude on learning science at school, learning of science outside school, and future scope of learning science. The attitude of students toward learning science was taken as a dependent factor while school factors, outside school factors, and the future scope related to science were taken as independent factors. There was an R-squared value of 0.623 indicating that 62.3% of the attitude is being explained to be dependent on three independent factors involved while the other

37.7% are dependent on some other unexplained variables. All three factors, school factors, outside school factors, and future scope related to science

are individually useful in predicting the attitude of students toward learning science.

Table 6: Result of multiple regression with attitude as dependent on the other three factors

ANOVA							
	<i>Df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>	<i>Multiple R</i>	<i>R squared</i>
Regression	3	132.91	44.304	170.864	2.2604E-65	0.789	0.623
Residual	310	80.38	0.259				
Total	313	213.29					
	<i>Coefficients</i>		<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>		
Intercept	-0.8312		0.2011	-4.1327	0.000		
school	0.6104		0.0510	11.9710	0.000		
outside school	0.1748		0.0298	5.8631	0.000		
Future scope	0.4010		0.0422	9.5061	0.000		

Note: no of observations = 314 * signifiacne at 0.05.

Following the predictive model, $Y = \beta + 0.61X_1 + 0.174X_2 + 0.40X_3$, attitude is influenced largely by school factors. Attitude toward science = $-0.83 + 0.61x$ school factor + $0.174x$ outside school factors + $0.40x$ future scope of learning science. The finding suggests that for every unit rise in school factors, the attitude of students toward science will increase by a factor of 0.61 keeping outside school factors and future scope related to science constant. The school factors were found to be the highest contributor among the three factors. The second contributing factor was found to be future scope related to science. The attitude of students toward science was predicted to increase by a factor of 0.40 with the unit rise in future scope related to science with school factors and outside school factors held constant. The least predictor among the three was the outside school factor contributing only about 0.17 rise in attitude with a unit rise in outside school factors, keeping school factors and future scope factors constant. Since all three factors discussed were found to significantly contribute to the attitude of students toward learning science, the alternate hypothesis was accepted.

DISCUSSION

The findings showed a high positive attitude of students toward learning science similar to the findings of Anwar and Bhutta (2014); Chetri (2022); Tanti, *et al.*, (2020); Perdana and Maison (2022). The findings indicate that students learn science with fun, they feel curious about learning science and their teacher is the main source of motivation for them to learn science. Students need to have a positive attitude toward learning any subject as it has implications for their learning pleasure. Students with a positive attitude were

found to engage in classroom activities and perform better academically (Ali & Awan, 2013).

Although there was a significant gender difference in the school factor with male students possessing greater interests in learning science over the female students (Ozden, 2008); Chetri (2022), no significant gender difference were observed in other three constructs namely, outside school factors, Future scope related to science and the attitude towards science. The overall findings indicate, both male and female students equally enjoy learning science and love studying science subjects, which is also seen through classroom activities where both male and female students take part with an unnoticeable difference in enthusiasm.

The result of one-way ANOVA suggested that there was no significant difference in the attitude of students toward science based on grades (Anwar & Bhutta, 2014). All students ranging from classes seven to ten were of similar views except for the outside school factors where there was a significant difference in their views based on levels. The result indicates that the students of classes seven, eight, and nine spend more time learning science outside school compared to students of class ten. Among the four groups, students of class ten spend the least time performing scientific experiments and learning science concepts at home. The findings seem relevant to the situation that the prescribed syllabus demands more complex experiments from classes 9 and 10 that are not easy to experiment at home due to lack of guidance and equipment, whereas, students of classes 7 and 8 are prescribed with simple experiments of which few are doable at home.

The regression model indicates school factor, learning of science inside the classroom with experimentation under the guidance of teachers was the greatest factor influencing the attitude of students toward learning science. Future scope related to science subject was the second leading factor indicating, students will develop a positive attitude toward the subject if there are ample learning and job opportunities in the future after taking science subjects in schools. The findings indicate the importance and the level of influence a teacher can make to motivate students and enhance their attitude toward learning science. Students' desire to learn a particular subject is influenced by involvement, purpose, and achievement (Anghelache, 2013).

The outcome of multiple regression indicated that all three factors; school factors, outside school factors, and future scope related to science were useful predictors of the attitudes of students toward learning science. The findings indicate school factors contribute more than the other two factors in enhancing the attitude of students. Classroom management (Taiwo, Ukamaka, & Abdallah, 2021) and the use of a variety of skills (Jatsho & Rinchen, 2016) while teaching (Papanastasiou & Papanastasiou, 2004) were found key to enhancing the attitude of students to learn science with interest. It was also found important to keep students motivated by letting them know about the variety of studies and job opportunities available for students taking up science.

RECOMMENDATIONS

Researchers, therefore recommend teachers to focus on the school factors to enhance their motivation towards learning science subjects as learning science in the school is found to be a major influencing factor for attitude. Teachers play a vital role in enhancing students' motivation through their classroom teaching. A jubilant teacher with high content efficacy is a blessing to schools and students (Das, Faikhanta, & Punsuvon, 2018) but teaching strategy and classroom management are equally important. Therefore, it is crucial to use a variety of teaching strategies (Sherab & Rinchen, 2016) and enhanced classroom management skills (Taiwo, Ukamaka, & Abdallah, 2021) to keep the interest of students gauged toward science. Students agreed ($M=3.3\pm 1.3$) that they love science subjects because of their teachers. Teachers can plan and teach science subjects with experiments whenever applicable as a majority of students strongly agree

($M=4.4\pm 0.9$) that science lessons are interesting with experiments. Simulations and other interactive computer-assisted tools can also be used to make the lesson lively and convincing when experiments are not feasible, as students love science lessons and understand better when ICT is incorporated (Tenzin, Tendar, & Zangmo, 2022).

It is also equally crucial for teachers to keep students reminded about the possible future scopes for further studies and jobs related to science subjects to escalate their motivation to learn science as the future scope is another factor with a significant impact on the attitude of students toward learning science subjects. Science Department in the school has the responsibility of producing science enthusiasts or scientists who can advance society using science and technology (Tyler and Osborne, 2011)

LIMITATIONS

The findings are limited only to students of classes seven to ten of Phuentsholing Middle Secondary school under Phuentsholing Municipality. Although respondents were assured that all the data collected would be anonymous and confidential, since researchers are teaching the same student respondents, it is likely for students to give positive responses to please their science teachers which will give researchers false data.

CONCLUSION

Attitude plays a vital role in any learning, people with a positive attitude toward learning will always develop the willingness and drive to learn and grasp concepts easily, while, a person with a negative attitude will develop a negative belief toward the subject as a result learning will not be pleasing for them. The positive attitude in the present study gives teacher researchers and management hope that their students have an inner drive for learning and are likely to perform better in science subjects further motivating them to take up science for their higher studies. Science in the higher classes needs more cognitive ability, hard work, and perseverance compared to commerce and arts streams.

The study found students in grades seven to ten to possess a high positive attitude toward learning science subjects with no significant gender difference and variation among different levels. The result of multiple regression suggests school factors have a major influence in enhancing the attitude of students toward learning science, it has become an obligation for teachers to keep them

motivated by using a variety of teaching skills, science projects, science exhibitions, and infusing technology in teaching. Students will choose to study a subject that is more meaningful and has future scope, therefore it is also equally important for teachers to frequently inform about the future scope and career track related to science so that students place a high degree of importance on the learning of science and at the same time enjoy learning science.

REFERENCE

1. Ali, M. S. & Awan, A. S. "Attitude Towards Science and its Relationship with Students' Achievement in Science." *Interdisciplinary Journal of Contemporary Research in Business*, 4.3 (2013), 707-718.
2. Anghelache, V. "3rd World Conference on Learning, Teaching and Educational Leadership (WCLTA-2012)." *Procedia - Social and Behavioral Sciences* (2013).
3. Anwar, L. F., Hasan, A. M. & Baderan, D. W. "Students' Learning Interest during Online Biology Course: A Correlation Study." *Jurnal Pendidikan MIPA*, 23.2 (2022), 529-539.
4. Anwar, N. P. & Bhutta, S. M. "Students' Attitude Towards Science in Lower Secondary Classes: Comparison Across Regions." *Journal of Educational Research*, 17.1 (2014), 77-90.
5. Astalini, A., Kurniawan, D. A., Kurniawan, N. & Anggraini, L. "Evaluation of Student's Attitude Toward Science in Indonesia." *Open Journal for Educational Research*, 3.1 (2019), 1-12.
6. Chetri, D. R. "The Attitude of grade 10th Students in Learning Science." *Journal of Research in Social Science and Language*, 2.1 (2022), 58-70.
7. Chetri, D. R., Tshering, K. & Wangchuk, S. "Perception of Teachers and Students on the Introduction of Satellite Development in the Physics Curriculum." *Journal of Research in Curriculum Instruction and Educational Technology*, 8.3 (2022), 43-66.
8. Das, P. M., Faikhamta, C. & Punsuvon, V. "Enhancing Bhutanese Students' Views of the Nature of Science in Matter and its Composition and Study of Gas Laws Through an Explicit and Reflective Approach." *Science Education International*, 29.1 (2018): 20-28.
9. Das, P. M., Faikhamta, C. & Punsuvon, V. "Enhancing Bhutanese Students' Views of the Nature of Science in Matter and its Composition and Study of Gas Laws Through an Explicit and Reflective Approach." *Science Education International*, 29.1 (2018): 20-28.
10. Duncan, D. K. & Arthurs, L. "Improving Student Attitudes about Learning Science and Student Scientific Reasoning Skills." *Astronomy Education Review*, 11.1 (2012): 1-12.
11. Elma, Ssmsudin, A. & Suhandi, A. "Analysis of Students' Creative Problem-Solving Ability in Static Fluids: Pilot study." *Jurnal Pendidikan MIPA*, 23.3 (2022): 816-823. [Link to the article: <http://jurnal.fkip.unila.ac.id/index.php/jpmipa/>]
12. Fulmer, G. W., Ma, H. & Liang, L. L. "Middle School Student's Attitudes Toward science, and Their Relationships with Instructional practices: A survey of Chinese students' preferred versus actual instruction." *Asia-Pacific Science Education*, 5.1 (2019).
13. Jakobson, B. & Wickman, P. "Transformation through Language Use: Children's Spontaneous Metaphors in Elementary School Science." *Science & Education*, 16.3-5 (2006): 267-289.
14. Jatsho, S. & Rinchen, S. "Strategies for Teaching Physics: An Action Research." *Educational Innovation and Practice - A biannual Journal of Samtse College of Education*, 1 (2016): 53-66.
15. Le, L. C. & Do, T. D. "Assessment of Factors Affecting Students' Learning Attitude: A Case Study In Some Public Universities In Ho Chi Minh City." *Multicultural Education*, 7.7 (2021): 401-411.
16. Lovelace, M. & Brickman, P. "Best Practices for Measuring Students' Attitudes toward Learning Science." *CBE—Life Sciences Education*, 12.1 (2013): 606-617.
17. Musengimana, J., Kampire, E. & Ntawiha, P. "Factors Affecting Secondary Schools Students' Attitudes toward Learning Chemistry: A Review of Literature." *EURASIA Journal of Mathematics, Science and Technology Education*, 17.1 (2021): 1-12.
18. Nidup, Y. "Can Google Classroom be Used as an Alternative for Classroom Teaching?" *International Journal of Education*, 10.3 (2022): 8-19.
19. Nidup, Y., Zangmo, S., Rinzin, Y., Yuden, S., Subba, H. R. & Rai, J. "The Perception of Class X Students of Phuentsholing Higher Secondary School towards Chemistry." *Anatolian Journal of Education*, 6.1 (2021): 51-66.

20. Oroujlou, N. & Vahedi, M. "Motivation, Attitude, and Language Learning." *Procedia - Social and Behavioral Sciences*, 29 (2011): 994–1000.
21. Osborne, J., Simon, S. & Collins, S. "Attitudes Towards Science: A review of the literature and its implications." *International Journal of Science Education*, 25.9 (2003): 1049-1079.
22. Ozden, M. "An Investigation of Some Factors Affecting Attitudes toward Chemistry in University Education." *Essays in Education*, 24.8 (2008): 1-10. [Link to the article: https://openriver.winona.edu/eie/vol24/iss1/8?utm_source=openriver.winona.edu%2Feie%2Fvol24%2Fiss1%2F8&utm_medium=PDF&utm_campaign=PDFCoverPages]
23. Papanastasiou, C. & Papanastasiou, E. C. "Major Influence on Attitude Toward Science." *Educational Research and Evaluation*, 10.3 (2004): 239-257.
24. Perdana, R., Asrial, A. & Maison, M. "The Effect of Science Attitudes Toward Science Process Skills of Junior High School Students in Jambi." *Jurnal Pendidikan MIPA*, 23.2 (2022): 360-372.
25. Saputra, A. & Tania, L. "Scientific Attitude of Prospective Science Teachers in Indonesia: A psychometric evaluation." *Jurnal Pendidikan MIPA*, 23.2 (2022): 419-427.
26. Sethi, U. "Study of Attitude of The Students Towards Science In Relation To Certain Non-School Factors." *International Journal of Education and Information Studies*, 5.1 (2015): 75-80.
27. Shabbir, M. & Awan, A. S. "Attitude Towards Science and its Relationship with Student's Achievement in Science." *Interdisciplinary Journal of Contemporary Research in Business*, 4.10 (2013): 707-718.
28. Taiwo, A., Ukamaka, A. & Abdallah, M. "Influence of Classroom Management on Students' Attitude towards Learning Science in Senior Secondary Schools in Nigeria." *Asian Journal of Educational Research*, 9.3 (2021): 69-85. [Link to the article: <http://www.multidisciplinaryjournals.com/>]
29. Tanti, Kurniawan, D. A., Anggraini, L. & Perdana, R. "A Study Analysis of Student Attitude to Science Lessons." *Journal of Education and Learning (EduLearn)*, 14.4 (2020): 566-574.
30. Tenzin, S., Tendar, P. & Zangmo, N. "Enhancing Students' Understanding of Abstract Concepts in Physics by Integrating ICT in Teaching-Learning Process." *Asian Journal of Education and Social Studies*, 26.2 (2022): 68-80.
31. Tytler, R. & Osborne, J. "Student Attitudes and Aspirations Towards Science." *Second International Handbook of Science Education*, (2011): 597-625.
32. Vilia, P. & Candeias, A. A. "Attitude Towards the Discipline of Physics-Chemistry and School Achievement: Revisiting factor structure to assess gender differences in Portuguese high-school students." *International Journal of Science Education*, 42.1 (2019): 133-150.

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