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Research Article

The Science Teachers' Communication Behavior in Relation to Students' Attitude and Performance

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ABSTRACT

The purpose of this study was to find out the relationship between the communicative behavior of teachers and the attitudes and performance of students in Science in Sta. Peregrina High School in Balatong B, Pulilan, Bulacan. In particular, the aim of this study was to find answers to the following questions: (1) What is the level Science teachers show in challenging, encouraging and praise, non-verbal support, understanding, and controlling behavior? (2) At what level is the attitude of the students towards science? (3) What is the performance level of students in science subject? (4) Are teachers' communication and students' attitudes toward science related to each other? and (5) Are teachers' communication and students' performance toward science related to each other? Descriptive quantifiable method of research was utilized in this study. The following conclusions were drawn: (1) Science teachers received very acceptable ratings for challenging, encouraging and praise, non-verbal support, understanding, and controlling behaviour as observed by their students. (2) Students have very acceptable attitudes to Science. (3) Students acquired an acceptable assessment in their Science grade. (4) There was no substantial relationship between challenging, encouraging and praise, controlling behaviour of teachers and the attitude of the students; challenging, encouraging and praise, understanding, and controlling behaviour of teachers and the students' academic performance. Yet, there was substantial relationship in non-verbal support and understanding behaviour of teachers and attitudes of students.

Keywords: *Attitude, Communication, Performance*

Introduction

Communication, regardless of how it is spoken, written or acted upon, involves the exchange of emotions, ideas and information. This activity involves the exchange of relevant information among two or more people, and

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will be recognized by them as a result of their joint interpretation. Communication between students and teachers is a way to bridge the gap and create a better environment in the classroom. However, a teacher will not know each student's problem in the classroom and can therefore take into account sufficient information for those students who find it difficult to perform particular tasks. The more teachers are connected or communicate with their students, the easier it is for them to help pupils learn at a high level and make quick progress. A positive relationship between teachers and students in the classroom will be established through their good communication skills, respect of teaching from a teacher's point of view as well as student learning.

Communication is the way of communicating information among people, particularly those who send it and receive it in order to understand one another. Communication tactics act as a guide for how knowledge is shared in a learning environment. For students to improve their skills and performance in the classroom, such tactics and instructor feedback are essential. Classroom discourse plays a vital role in the learning process, and teachers should consider it during the teaching and learning process (Dhillon & Kaur, 2021).

Information is constantly exchanged verbally and nonverbally throughout communication. Positive and bad communication behaviors can strengthen or weaken relationships. Relationships are strengthened when one knows how others express their emotions. Misunderstood communication tactics, however, can foster distance and false information. A situation can turn out positively or negatively depending on the choice of communication behavior.

Individuals with their unique personality traits, attitudes, beliefs, and emotions are always a part in communication. Social conduct both shows how these psychological elements have an impact on it and changes it as individuals affect one another, frequently without being fully aware of what is happening. Influence can essentially be thought of as a transmission process. However, if interaction alters participants in a reciprocal way and results in group actions that would not have happened otherwise, communication becomes a constitutive model. From a socio-psychological standpoint, the challenge of communication is how to effectively manage social interaction in order to achieve desired and anticipated outcomes.

Statement of Problem

This study attempted at understanding, through empirical evidence, how communication behaviour becomes a causative factor in students' attitude and performance in Science. The following questions were sought in this research:

1. What is the level Science educators show in the following communication behavior:
   1.1 challenging;
   1.2 encouraging and praise;
   1.3 non-verbal support;
   1.4 understanding; and
   1.5 controlling?
2. At what is the attitude of the students toward Science subject?
3. What is the performance level of students in Science subject?
4. Are teachers' communication and students' attitudes toward science related to each other?
5. Are teachers' communication and students' performance toward science related to each other?

Hypotheses of the Study

The following null hypotheses were verified at 0.05 – level of significance.

1. Educators' communication behavior and students' attitudes toward Science are not related to each other.
2. Educators' communication behavior and students' performance toward Science are not related to each other.

Conceptual Framework

The aim of this study was to establish the influence of independent variables in terms of teachers' communication styles on a dependency factor, namely student achievement in science. Teachers' communication behavior refers to how teachers relate with their students, be it in verbal or non-verbal manner. In the study,

five elements of teachers' Communication Behavior were used as a component: challenging, encouraging and praise, unprejudiced support, understanding and controlling. In view of significant influence on students' abilities, the five categories of teacher communication practices are taken into account.

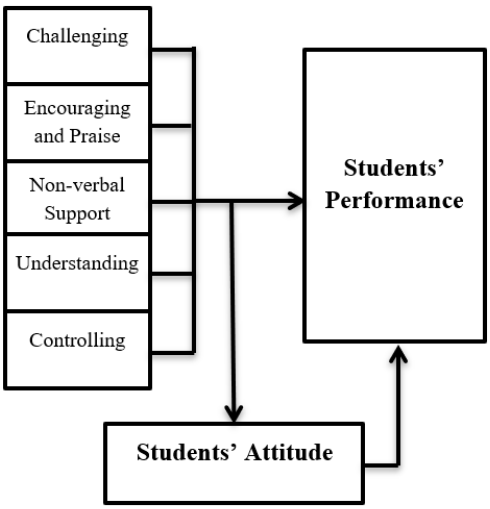

Figure 1. Paradigm of the Study

The students' performance in science subject can be affected by the communication behaviour of teachers in challenging, encouraging and praise, non-verbal support, understanding, and controlling as well as moderating variables like the progress in students' attitudes in Science. The arrows connecting the frame showed that the performance of students can be influenced by their teachers' communication behaviour as well as the attitudes of the students in the subject. Positive attitudes toward the subject itself must be developed if one is to learn it effectively.

Related Literature

The idea that teachers cannot simply impart knowledge to their students is one of the most crucial principles in educational psychology. Learning must be self-constructed by students in order for it to be effective. The teacher can aid in this process by giving students opportunity to find or apply ideas on their own, by providing them with opportunities to do so, and by helping them become aware of and deliberate users of their own learning processes.

An attitude is a declaration of support for or opposition to someone, something, or an event. A teacher who encourages students to do well and be intrinsically motivated helps students develop their skills in learning. Teachers may also deliver intrinsic rewards such as praise, a touch, or a smile. These are more effective than extrinsic rewards in producing long-term behavioural effects. Teachers who strive to develop rapport and show respect for their students help their learners acquire confidence. Good teachers show their willingness to help their learners obtain confidence through their communication with their students (Kim, 2017).

According to Bambaeeroo and Shokrpour (2017), performance, or the level of achievement, signifies a person's ability to accomplish. Measuring this ability means an assessment of the learner's accomplishments and attainments in school subjects which are outcomes of instruction in the school situation. The quality of student's achievement is only as good as the quality of the resource inputs to realize our objective of upgrading the quality of student's achievement, and then the quality of inputs is improved.

Educators agree on the necessity of the setting of positive learning environment for students. Students who can be very optimistic in facing difficult lessons will not be stopped in

getting their goals, while those who developed feelings of pessimism and lack of confidence often abandon the aim to succeed. Emotions play a very important role in the students' motivation. These emotions are set by the teacher's approaches. Students usually perceive teachers who conduct informal classes or those which do not require strict sequencing of classroom events as smarter and more knowledgeable about the subject matter. They do not usually like the very stiff and serious flow of discussions for these do not give them positive learning environment (Liu, 2021).

Review of Related Studies

In communication studies, researchers have generally focused on human behavior rather than organisms or things. Communication researchers can study different types of behavior before Other researchers are interested in communication outcomes, verbal encouragement and nonverbal support, and being kind and understanding while actively listening to students' questions, were simple but effective ways of facilitating communication between teachers and students. This can significantly influence students' attitude and performance in science (Amin et al., 2021).

According to Barak (2017), emphasized that teacher-related factors have the greatest impact on student achievement in school. Experts say what happens at the end of the school is the result of what happened in class. Teachers' conduct, since it is a vital part of teaching promoters, has been an important factor in students' learning. Consequently, the quality of teaching staff does not solely depend on a faculty's evaluation and is also an indication of students' future performance.

Xie and Derakhshan (2021) concluded that teachers' attitude towards science affects the learning of the students. If the student does not learn science at all, the formation of the right attitude towards science may be hampered and the students may develop a negative attitude towards science. The students pointed out that the teacher has a significant role to play in their learning. The characteristics are reflected in the patterns of change that occur in them. This implies that the teachers must really be well trained and imbued with the right attitudes so as to influence the right changes in the students under their care, because these students will later on become important resources in the nation's scientific and technological aspects.

Methodology

Methods and Techniques of the Study

This study used descriptive quantitative research methods to investigate the relationship between teachers' communication behaviors and students' attitudes and performance in science. The researchers utilized the method to clarify one's understanding of important phenomena through the identification of relationship among variables. It is considered appropriate and effective in describing present status of phenomena.

Population and Sample of the Study

Table 1 below shows the student-respondents in Sta. Peregrina High School located in Balatong B, Pulilan, Bulacan. The sample was composed of Senior High School and asked to answer the questionnaire.

Table 1. Respondents of the Study

Grade Level	Total Population	Number of Respondents
Grade 12	185	185
TOTAL	185	185

Research Instrument

This study adopted the Teachers' Communication Behaviors Questionnaire (TCBQ) that was developed by She and Fisher (2002). The 40-item questionnaire assesses students' perceptions of the following five important teacher behaviors: challenge - the extent to which students are being challenged in their learning by the use of higher order questions by teachers; encouraging and praise – the extent the teacher praises and encourages students; non-verbal support - the extent of the teacher's use of

nonverbal communication in terms of positive interactions with students; understanding – the extent the teacher's understood and cared for his students; and controlling - how much a teacher will monitor and direct student behavior in the classroom. Each item is scored into five scales ranging from 5 (almost always) to 1 (almost never).

Gathering Procedure

To carry out the study, permission was requested from Sta. Pilgrim High School. In order to obtain students' perceptions of teachers' communication behaviour, the Teacher Communication Behavior Questionnaire has been used. Following a careful discussion-orientation of the research focus, the questionnaire was personally administered. Sufficient time was provided for an efficient and effective accomplishment of the questionnaire. To be able to elicit honest answers from the respondents, the researchers expressed the confidentiality of the information that they will provide. This process will ensure 100 percent retrieval of the data from the respondents.

Data Processing and Statistical Treatment

The arithmetic mean is used to determine the average, and it can be used to provide comments or analysis of a set of values. Arithmetic Mean can be computed using the formaula:

$$M = \frac{\sum fX_i}{n}$$

where:

M = mean
X_i = scores
n = sample size
f = frequency

The frequency distribution shows us the grouping of data into mutually exclusive sets, and the number of occurrences in a set. This is how unordered data can be displayed. There are a few types of charts that can be used for frequency distribution, namely histograms, line graphs, bar graphs and pie graphs. In both qualitative and quantitative data, the frequency distribution is used. This can be calculated using the following formula:

$$P = \frac{x}{n}(100\%)$$

where:

P = percentage distribution
x = part of a sample size
n = total sample size

Standard deviation is a measure of the distribution of numbers. The formula is:

$$S = \sqrt{\frac{\sum_{i=1}^{n}(X_i - X)^2}{n-1}}$$

where:

x = mean value
N = sample size
X_i = value from i=1 to i=N
$\sum$ = sum of the values

The formula for Pearson (*r*) is:

where:

r = correlation between x and y
n = number of cases
$\sum xy$ = summation of the product of x and y
$\sum x$ = summation of x
$\sum y$ = summation of y
$\sum x^2$ = summation of the square of x
$\sum y^2$ = summationof the square of y

The regression analysis helps to understand how, when one independent variable is changed and the other independent variables are fixed, the typical value of the dependent variable or the criterion variable changes. Using multiple regressions, we can add additional variables to the model and also estimate their effect on the dependent variable. Multiple regression analysis is a method for analysing 2 or more independently determined variables or one or more nonlinear predictors. A number of regression analyses are similar to a simple regression analysis. But it's more complicated in terms of concept and calculation.

The general form of multiple regression equation is

$$Y^1 = a + b_1x_1 + b_2x_2 + \ldots + b_nx_n$$

where:

Y^1 = variable being predicted
$x_1, x_2 \ldots, x_n$ = the predictor variables
"n" in x_n = number of predictors
"a" = y-intercept
b_1, b_2, and b_n = regression coefficients

Students' perceptions of their Teachers' Communication Behaviors were interpreted using the scale as follows:

Mean	Descriptive Classification
4.20 – 5.00	Exceptional
3.40 – 4.19	Very Acceptable
2.60 – 3.39	Acceptable
1.80 – 2.59	Fair
1.00 – 1.79	Poor

The attitude of students toward Science subject was measured using the scale below:

Mean	Descriptive Classification
4.20 – 5.00	Exceptional
3.40 – 4.19	Very Acceptable
2.60 – 3.39	Acceptable
1.80 – 2.59	Fair
1.00 – 1.79	Needs Improvement

Student performance in science was measured on the scale below:

Range of Grades	Performance
91 – 100	Outstanding
82 – 90	Satisfactory
75 – 81	Poor

Ethical Consideration

When conducting this study, the researchers were concerned with moral principles. Sincerity and integrity are the moral standards they have adopted, and they have confirmed that none of their information was either created or falsified. The researchers also made sure that none of their participants would be coerced into taking part in them, and that none of them because of their involvement, were harmed. In contrast to all other materials and data, to guarantee that intellectual property rights were respected, the papers included in this analysis were properly cited.

Data Analysis

To quantify the data that were obtained in this study, arithmetic mean and standard deviation were used as basis for summary statistics and information on the level of teachers' communication behavior as perceived by their students. To measure relations between two variables X and Y using a single number known as the correlation coefficient Pearson's product moment correlation coefficient was used. The probability that the effect is not due to chance alone is statistical significance. It's part of the statistical hypothesis test, where it is used as a basis for valuation. Where it is used as a significant part of the valuation process, this element plays an essential role in statistics hypothesis testing. As statistics show, a result is considered relevant in the sense of relevance not for its meaning or significance but because it's predicted as an unlikely chance. In determining which studies will lead to rejection of the null hypothesis based upon a predetermined low probability threshold called pValues, this test must be used in order for researchers to decide whether there is enough information that would raise doubts about the results. with the null hypothesis. P-values are often associated with a level of significance or alpha (α), which is also predetermined, usually 0.05 (5%). Consequently, if there is a Pvalue lower than 0.05, it shall be regarded by statistical significance and the negative hypothesis was rejected. Nonetheless, depending on the field of study, other significance levels such as 0.1 or 0.01 are also used. Multiple regression analysis was also used to discover the relationship between teachers' communication behavior and students' attitudes and performance in science.

Results and Discussion

This presents the results of the study together with the analysis and interpretation of data gathered from the questionnaire and from the results of students' attitude and performance in Science.

Level of Teachers' Communication Behavior

Table 2. Science Teachers' Challenging Communication Behavior

	5	4	3	2	1	Mean	Verbal Interpretation
	f / %	f / %	f / %	f / %	f / %		
1. This teacher's been asking me questions about what I can do to solve the problem.*	47 25.41%	47 25.41%	78 42.16%	10 5.41%	3 1.62%	3.68	Very Acceptable
2. The teacher is asking me a lot of questions, which makes me reflect on what I'm learning in class..*	49 26.49%	66 35.68%	43 23.24%	23 12.43%	4 2.16%	3.72	Very Acceptable
3. The teacher's asking me questions that call for a careful analysis of the information before I can respond..*	52 28.11%	70 37.84%	48 25.95%	15 8.11%	0 0%	3.86	Very Acceptable
4. This teacher is asking me questions that make it necessary for me to apply a judgment in answering those questions..*	31 16.76%	63 34.05%	65 35.14%	22 11.89%	4 2.16%	3.51	Very Acceptable
5. This teacher asks me questions that are forcing me to use what I've learned in class for my answers..*	43 23.24%	66 35.68%	57 30.81%	19 10.27%	0 0%	3.72	Very Acceptable
6. I'm asked questions by this teacher that require integration of information which I learn..*	34 18.38%	54 29.19%	68 36.76%	19 10.27%	10 5.41%	3.45	Very Acceptable
7. This teacher is asking me questions that need to be understood what I've learned at school in order for me to reply..*	40 21.62%	81 43.78%	47 25.41%	13 7.03%	4 2.16%	3.76	Very Acceptable
8. The teacher asks me questions, and I have to answer them in person..*	56 30.27%	61 32.97%	49 26.49%	12 6.49%	7 3.78%	3.79	Very Acceptable
Average Mean						3.69	Very Acceptable

Legend: f = frequency %= percentage

Result indicates that Science teachers have a very acceptable level of communication behaviour in the category of challenging behaviour based on the average mean of 3.69. It could be that the teachers have the liking to ask challenging questions to their students in their desire to bring out the best among them. In a classroom setting, asking questions is the commonly used strategy to facilitate learning and to check students' understanding.

Statement number 3 "This teacher ask questions that require me to carefully analyze information in order to answer" obtained the highest mean value of 3.89, which is considered to be Very Acceptable. This means that Science teachers asked their students leading questions that will give the teachers a gauge of how students analyse the questions in order to answer. They also give guide questions over questions that seem to be interrogating and require deep contemplation and concentration. Through asking questions, the competence of teachers is as stake so they make it a point that students understand the lessons using questions. Asking questions is a tool for a teacher to meet his/her objectives.

The data presented in table 2 is in contrast to what Campbell (2015) stated, that "there are many classrooms in which teachers rarely pose questions above the "read-it-and-repeat-it" level. Questions that require discussion, especially hypothesizing or creative transfer of information to new situations, just don't come up often. It simply means that generations evolve according to education.

Table 3. Science Teachers' Encouraging and Praise Communication Behavior

	5	4	3	2	1	Mean	Verbal Interpretation
	f / %	f / %	f / %	f / %	f / %		
9. I'm asked to give my opinion in the discussions by this teacher..*	81 43.78%	54 29.19%	40 21.62%	10 5.41%	0 0%	4.11	Very Acceptable
10. I'm encouraged to discuss the answers with this teacher..*	47 25.41%	74 40.00%	54 29.19%	10 5.41%	0 0%	3.85	Very Acceptable
11. This teacher's encouraging me to talk with other students about my ideas..*	36 19.46%	64 34.59%	57 30.81%	26 14.05%	2 1.08%	3.57	Very Acceptable
12. This teacher is encouraging me to speak out about the subject. *	50 27.03%	54 29.19%	59 31.89%	20 10.81%	2 1.08%	3.70	Very Acceptable
13. This teacher admires me for asking the right questions..*	43 23.24%	53 28.65%	61 32.97%	20 10.81%	8 4.32%	3.56	Very Acceptable
14. The teacher's praising the answers I gave him..*	60 32.43%	63 34.05%	51 27.57%	7 3.78%	4 2.16%	3.91	Very Acceptable
15. As part of the lesson, this teacher uses my ideas..*	32 17.30%	59 31.89%	66 35.68%	23 12.43%	5 2.70%	3.49	Very Acceptable
16. The teacher is going to use my answers in his explanation of the lesson..*	30 16.22%	62 33.51%	70 37.84%	23 12.43%	0 0%	3.54	Very Acceptable
Average Mean						3.72	Very Acceptable

Legend: f = frequency %=percentage

While the teachers' asked for the students' opinion during discussion, the results indicate that Science teachers are perceived to be teacher-centered. Their communication behaviour is quite different from the student-centered because there seems to be a dearth or deficiency on the teachers' encouragement for the students to discuss the answers to the questions.

Item number 14 got the mean score of 3.91 interpreted as very acceptable. The teachers are very evident of praising the answers of their students in class. This will help the students to motivate to answer in class because the teachers are very appreciative of their answers.

Khamidovna (2021) stated that if the students obtain reinforcement for certain behaviour, they tend to repeat it with vigor, and if they do not receive necessary reinforcement, students tend to lose interest and their performance suffers. This encouraging and praising category of communication behaviour are examples of stimuli that can be given after a display of behaviour which can influence the comportment of the students. Stronger support can be reinforcement given to students, for example, praise immediately after answering the given questions, rather than a much later grade.

Table 4. Science Teachers' Non-Verbal Support Communication Behavior

	5	4	3	2	1	Mean	Verbal Interpretation
	f / %	f / %	f / %	f / %	f / %		
17. This teacher's nodding his head in acknowledgement of the fact that he understands my views.*	47 25.41%	64 34.59%	55 29.73%	13 7.03%	6 3.24%	3.72	Very Acceptable
18. When I have trouble answering a question, the teacher is nodding at his head to show support.*	43 23.24%	76 41.08%	40 21.62%	20 10.81 %	6 3.24%	3.70	Very Acceptable
19. The teacher is expressing support for me with his facial expression without speaking.*	44 23.78%	69 37.30%	50 27.03%	14 7.57%	8 4.32%	3.69	Very Acceptable
20. Without speaking, this teacher supports me when I have a problem through his/her facial expression.*	30 16.22%	58 31.35%	72 38.92%	14 7.57%	11 5.95%	3.44	Very Acceptable
21. This teacher shows that he understands my opinion without speaking, through the expression of his or her face.*	36 19.46%	75 40.54%	52 28.11%	17 9.19%	5 2.70%	3.65	Very Acceptable
22. Without saying a word, the teacher's expression shows her enthusiasm for my answer through his or her face.*	31 16.76%	53 28.65%	76 41.08%	22 11.89 %	3 1.62%	3.47	Very Acceptable

	5	4	3	2	1	Mean	Verbal Interpretation
23. Without speaking, this teacher's enthusiastic reaction to my question can be seen in her face.*	34 18.38%	47 25.41%	86 46.49%	16 8.65%	2 1.08%	3.51	Very Acceptable
24. This teacher shows his support through his or her eyes without saying a word..*	30 16.22%	76 41.08%	60 32.43%	15 8.11%	4 2.16%	3.61	Very Acceptable
Average Mean						3.60	Very Acceptable

Legend: f = frequency %= percentage

As a whole, the average mean for the non-verbal supporting aspect of communication behaviour of Science teachers is 3.60 with a verbal interpretation of very acceptable. The highest mean registered among the benchmark statements is 3.72 which is interpreted as very acceptable in the teachers' non-verbal supporting category which is manifested by nodding their heads to show understanding of the students' opinion. This means that nodding is generally the most exhibited non-verbal support given by Science teachers to their students. This further means that students draw encouragement and support when their teacher nods during instances when they are answering and giving their opinions in Science class. The students perceived this gesture from their teachers as a source of a renewed sense of enthusiasm to capture the lessons taught on the said subject and a source of strength when they are giving opinions in class. Nodding conveys an exact meaning of affirmation.

According to Kim (2017), the most obvious form of paralanguage is body language or kinesics. This is the language of gestures, expressions, and postures. Among the body languages exhibited by Science teachers, nodding is the most evident. This gesture can be used by teachers as a way in communicating with their students. Tone of voice, facial expressions, and other body language are also forms of communication. As presented in table 4, nodding is the most exhibited non-verbal supporting. This means that it is the body language well understood by the students. It is also a non-verbal supporting given by Science teachers with a concrete meaning of affirmation that can easily be interpreted by their students.

Table 5. Science Teachers Understanding Communication Behavior

	5	4	3	2	1	Mean	Verba Interpretation
	f / %	f / %	f / %	f / %	f / %		
25. The teacher trusts that I can solve the tough exercise problems..*	56 30.27%	84 45.41%	31 16.76%	13 7.03%	1 0.54%	3.98	Very Acceptable
26. This teacher is going to explain it all over again, especially after school hours.*	55 29.73%	59 31.89%	52 28.11%	15 8.11%	4 2.1%	3.79	Very Acceptable
27. This teacher's going to listen if I have something to say.*	100 54.05%	59 31.89%	21 11.35%	0 0%	5 2.70%	4.35	Exceptional
28. This teacher realizes when I do not understand the discussion by his/her eye contact and repeating the topic again.*	44 23.78%	86 46.49%	40 21.62%	14 7.57%	1 0.54%	3.85	Very Acceptable

	5	4	3	2	1	Mean	Verba Interpretation
29. When I constantly ask these questions and they're not understood by me, this teacher is very patient with me.*	70 37.84%	72 38.92%	37 20.00%	6 3.24%	0 0%	4.11	Very Acceptable
30. This teacher is friendly by smiling to me and says good morning or good afternoon.*	93 50.27%	48 25.95%	34 18.38%	9 4.86%	1 0.54% 0	4.21	Exceptional
31. This teacher is someone I've got to depend on, especially if I have a personal problem..*	13 7.03%	62 33.51%	57 30.81%	37 20.00 %	16 8.65%	3.10	Acceptable
32. I'm cared for by this teacher, who explains to me the complicated lessons in person, especially after class time.*	20 10.81%	52 28.11%	62 33.51%	39 21.08 %	12 6.49%	3.16	Acceptable
Average Mean						3.82	Very Acceptable

Legend: f = frequency % = percentage

Table 5 shows that the teachers' understanding behaviour that, if the students have something to say, the teacher will listen, got the highest mean score of 4.35, which is statement number 27. This means that if the students have something to say, the teacher is all ears. This further means that students are comfortable when their teachers extend listening ears to their thoughts. They appreciate teachers who are willing to listen and do not ignore them and take them for granted. The teacher helps a lot when he/she listens to the students. Such makes the latter feel they are important and appreciated.

Khan et al. (2017) described the different kinds of teachers. To his students, a friendly teacher is a friend. A teacher friend combines both the guidance of a teacher and the understanding of a friend. We all aspire to an understanding teacher at some point, a teacher who acts as a friend, philosopher, and guide. We're not deviating from our real path as long as we have a friend to teach us. There has to be certain character traits in every teacher. Such a teacher is respected as closer to pupils, and regarded as better at teaching.

Table 6. Science Teachers Controlling Communication Behavior

	5	4	3	2	1	Mean	Verbal Interpretation
	f / %	f / %	f / %	f / %	f / %		
33. This teacher's standards of behavior are very high, making sure his or her students know how to behave inside and outside school.*	71 38.38%	71 38.38%	32 17.30%	7 3.78%	4 2.16%	4.07	Very Acceptable
34. In his/her lecture class, this teacher expects me to comply with her instructions. *	79 42.71%	67 36.22%	29 15.68%	6 3.24%	4 2.16%	4.14	Very Acceptable

	5	4	3	2	1	Mean	Verbal Interpretation
35. This teacher keeps insisting that I comply with the rules of his and hers by outlining penalties for every infringement.*	20 10.81%	66 35.68%	62 33.51%	27 14.59 %	10 5.41%	3.32	Acceptable
36. The teacher's insisting that I do everything he's telling me to do by giving me a deduction for my mistakes.*	26 14.05%	45 24.32%	58 31.35%	26 14.05 %	30 16.22 %	3.06	Acceptable
37. This teacher's trying to make sure I do what he told me to do in the activities.*	32 17.30%	48 25.95%	72 38.92%	19 10.27 %	14 7.57%	3.35	Acceptable
38. The teacher won't allow me to do things differently than what he's expecting, by reminding me that they're not connected to what I have to do.*	25 13.51%	45 24.32%	73 39.46%	21 11.35 %	21 11.35 %	3.17	Acceptable
39. I'm very pleased that this teacher reminds us about the standard of conduct expected from all students, before we go to class.*	47 25.41%	66 35.68%	51 27.57%	15 8.11%	6 3.24%	3.72	Very Acceptable
40. This teacher wants me to follow his instructions and avoid deductions.*	62 33.51%	49 26.49%	44 23.78%	16 8.65%	14 7.57%	3.70	Very Acceptable
Average Mean						3.57	Very Acceptable

Legend: f = frequency % = percentage

As a whole, the average mean rating obtained is 3.57 with a qualitative rating of very acceptable. This means that, as perceived by their students, Science teachers have a very acceptable level of controlling behaviour during their Science class.

Among the four (4) benchmark statements perceived by the student-respondents as very satisfactory, the 34th item received the highest score of 4.14. In other words, the teacher's expectations of students are to follow his instructions during a lecture. It also means that the teachers set the rules and give instructions to guide the students in activities related to the subject. The instructions given by the teachers help the students to do things correctly and achieve the goals set for the lesson.

Dewi et al. (2017) stated that there are broad types of relationships between teacher and students characterized by the management style adopted by the teacher. The teacher does not interfere with students' choices and actions. The teacher directs the action of students, plans them, sets the limits on their behaviour and considers them as passive receivers of instructions and information. This management style of Science teachers can be explained by the fact that Science is an exact field of study; teachers must give clear instructions for the students to obtain accurate and precise answers.

Level of Attitude of Students toward Science

Table 7. Level of Attitude of the Students toward Science

	5	4	3	2	1	Mean	Verbal Interpretation
	f / %	**f / %**	**f / %**	**f / %**	**f / %**		
1. Science as a subject is more interesting and enjoyable as compared to other subject I enrolled.	39 21.08%	72 38.92%	63 34.05%	8 4.32%	3 1.62%	3.74	Very Acceptable
2. I find Science as providing some practical solutions to simple problems in life.	37 20.00%	98 52.97%	46 24.86%	1 0.54%	3 1.62%	3.89	Very Acceptable
3. I am eager to learn more about Science.	49 26.49%	69 37.30%	60 32.43%	4 2.16%	3 1.62%	3.85	Very Acceptable
4. I think Science is important only at school.	4 2.16%	8 4.32%	27 14.59%	94 50.81 %	52 28.11 %	2.02	Fair
5. If the opportunity comes my way, I'd like to be responsible for a project in class on Science..	14 7.57%	41 22.16%	101 54.59%	22 11.89 %	7 3.78%	3.18	Acceptable
6. If I don't understand a Science topic discussed in class, I read more about it.	28 15.14%	87 47.03%	61 32.97%	1 0.54%	8 4.32%	3.68	Very Acceptable
7. The more I learned about Science, the more I like it.	58 31.35%	91 49.19%	33 17.84%	0 0%	3 1.62%	4.09	Very Acceptable
8. If higher Science would be required in my curriculum/course, I would welcome it with enthusiasm.	47 25.41%	73 39.46%	58 31.35%	5 2.70%	2 1.08%	3.85	Very Acceptable
9. I put a lot of effort as much as I could when it comes to Science homework.	36 19.46%	80 43.24%	63 34.05%	2 1.08%	4 2.16%	3.77	Very Acceptable
10. In preparing for Science exam, I review carefully, making sure I understand everything.	85 45.95%	83 44.86%	14 7.57%	0 0%	3 1.62	4.34	Exceptional
Average Mean						3.64	Very Acceptable

Legend: f = frequency % = percentage

The level of students' attitudes towards science is shown in Table 7. In the ten benchmark statements presented, item number 10 got the highest mean rating of 4.34 with a qualitative value of excellent. This means that when preparing for a science exam, students carefully

check and make sure they understand everything. This further means that although the examination in Science can be either hard or easy, the students exert much effort to understand the scope of the examination. This can be concluded also that maybe, the students are scared to their teachers, they are afraid to fail, they are pressured by their parents, or they wanted to prove that even though the Science is a hard subject, they can be able to pass this and get high grades.

According to DeWitt, Archer, and Mau (2016), students' science aspirations have been found to associate with their attitudes and beliefs, such as their interest in science, perceived utility of science, and their confidence in their own science abilities. Broader aspects of students' lives, such as their home or extracurricular activities in science, can also be important. However, the importance or impact of classroom experiences and teaching methods remains unclear. Indeed, it is difficult to know which attitudes and worldviews or learning experiences are linked with the intention of students to study science in order that they can be used as a motivation for more students to start studying science.

Level of Performance of Students toward Science

Table 8. Students' Level of Performance toward Science

Grades	Frequency	Percentage	Verbal Interpretation
97 –100	1	0.54	Outstanding
94 – 96	16	8.65	Outstanding
91 – 93	36	19.46	Outstanding
Total	53	28.65	
88 – 90	46	24.87	Satisfactory
85 – 87	39	21.08	Satisfactory
82 – 84	15	8.11	Satisfactory
Total	100	54.06	
79 – 81	19	10.27	Poor
76 – 78	13	7.03	Poor
75	0	0	Poor
Total	32	17.30	
Mean = 2.13			Satisfactory

Table 8 indicates that 54.06% or 100 out of 185 student-respondents obtained a satisfactory rating in Science class. It is followed by 28.65% or 53 respondents who got an outstanding rating while only 17.30% or 32 respondents got poor rating.

The teachers, being the most important element in instruction, should receive primary attention, and solving problems concerning them will be a major step in solving the problems of the educational system, thus, raising the level of academic achievement of the students. The academic performance, however, can be a gauge or backdrop on the prevailing performance on, and state of science education in the Philippines. Given this performance, it is but proper to have a review of our collective efforts in relation to the performance of other countries. The current state of science education in the Philippines, particularly in the basic education level, lags behind other countries, and certainly necessitates remedial action (Che Ahmad, 2017).

A Regression Analysis of Teachers' Communication Behavior on Students' Performance In Science

Table 9. Teachers' Communication Behavior on Students' Performance In Science

	P-value	Result	Analysis
Teachers' Challenging Communication Behavior vs. Students' Attitude	0.062	Accepted	Not significant
Teachers' Encouraging and Praise Communication Behavior vs. Students' Attitude	0.133	Accepted	Not significant
Teachers' Non-verbal Support Communication Behavior vs. Students' Attitude	0.002	Rejected	Significant
Teachers' Understanding Communication Behavior vs. Students' Attitude	0.012	Rejected	Significant
Teachers' Controlling Communication Behavior vs. Students' Attitude	0.455	Accepted	Not significant
Teachers' Challenging Communication Behavior vs. Students' Science Performance	0.459	Accepted	Not significant
Teachers' Encouraging and Praise Communication Behavior vs. Students' Science Performance	0.395	Accepted	Not significant
Teachers' Non-verbal Support Communication Behavior vs. Students' Science Performance	0.297	Accepted	Not significant
Teachers' Understanding Communication Behavior vs. Students' Science Performance	0.317	Accepted	Not significant
Teachers' Controlling Communication Behavior vs. Students' Science Performance	0.351	Accepted	Not significant

The null hypotheses were tested with Pearson's product moment coefficient correlation test at the 0.05 significance level using a two-tailed test.

Because the p-values challenging communication behavior of teachers against the attitude of students (0.062), encouraging and praise communication behavior of teachers against the attitude of students (0.133), the controlling communication behavior of teachers against the attitude of students (0.455) , the challenging communication behavior of teachers against the science performance of students (0.459), the encouraging and praise communication behavior of teachers vs. students' performance in science (0.395), teachers' non-verbal support communication behavior vs. students' science performance (0.297), teachers' understanding communication behavior vs. students' science performance (0.317), and teachers' controlling communication behavior vs. students' science performance (0.351) was greater than 0.05 - significance level, the null hypothesis was accepted. There were no substantial relationships between teachers' challenging communication behaviors and students' attitudes, teachers' encouraging and praise communication behaviors and students' attitudes, teachers' communication behaviors and control of students' attitudes, teachers' challenging communication behaviors and the attitudes of students encourage students and praise teachers' communication behavior and understand students' scientific performance, understand teachers' communication behavior and students' scientific performance, and manage teachers' communication behavior and students' scientific performance.

Non-verbal communication behavior vs. attitude (0.002) and understanding of communication behavior vs. attitude (0.012) had p-values below 0.05 - level of significance; therefore, the null hypothesis was rejected. There was a substantial relationship between teachers' non-verbal support communication behaviors and students' attitudes, and teachers'

communication behaviors and understanding of students' attitudes.

Conclusions

The following conclusions were reached on the basis of these findings:

1. Science educators received highly sacceptable scores for challenging communicative behavior, encouraging and praising communicative behavior, nonverbal communicative behavior, understanding communicative behavior, and controlling students' communicative behavior.
2. A very satisfactory attitude towards science has been expressed by most students.
3. In most grades of science, the students are rated pretty good.
4. There is no substantial relationship between the challenging communication behaviors of teachers and the attitudes of students, encouraging and praise communication behaviors of teachers and the attitudes of students, controlling communication behaviors of teachers and students, challenging communication behaviors of teachers and science. encouraging and praise student performance, teacher communication behavior and student science performance, understanding teacher communication behavior and student science performance, and controlling teacher communication behavior and student science performance. However, there is a substantial relationship between teachers' non-verbal support communication behaviors and students' attitudes, and between teachers' understanding communication behaviors and students' attitudes.

Recommendations

The following recommendations shall be taken into account as a result of the observations and findings from the data:

1. The researcher recommends that the teachers should continue to show different behavior in the classroom environment in order for the students to participate in class since they got a very satisfactory rating.
2. Since most students are very satisfied with science, teachers should continue to encourage students to participate in classroom discussions and activities.
3. Most of the students got a very acceptable grade in the science class, therefore, the researcher recommends determining the role of communication behavior of teachers to enhance the ability of the students by giving ample problem solving/exercises for them to better understand the topics discussed.
4. Teachers should further develop the nonverbal supporting communication behavior and understanding communication behavior because the students are motivated to participate and show positive attitudes in class if their teachers are friendly.
5. The researcher also recommends making a consultation time to accommodate the needs of the students. The teachers must be consistent also in giving instructions to avoid unnecessary incidents inside and outside the classroom.
6. The researcher suggests that studies on other factors which affect the performance of students in Science be done and tried in the future. Similar studies on teachers' communication behavior should be conducted but should include other variables which have not been investigated like personal factors of students, knowledge, attitude, and skills of Science teachers.

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