NON-COGNITIVE SKILLS AND MATHEMATICS PERFORMANCE OF GRADE 8 STUDENTS: AN INPUT TO STUDENT DEVELOPMENT PROGRAM

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Abstract : The study determined the relationship between non-cognitive skills and Mathematics performance of Grade 8 students of Gulod National High School, City Schools Division of Cabuyao, Laguna, Philippines, during the school year 2018- 2019. The study was conducted among 447 students with 220 male and 227 female respondents. Descriptive-correlational type through questionnaire was used to gather information. The levels of respondents' non-cognitive skills were "Somewhat Gritty" for Grit, "Average level" for Interpersonal, "High level" for Intrapersonal and Adaptability. Intrapersonal and Attitude are found to be inversely related to Mathematics performance. Based on the analysis of the data gathered, it has been concluded that there is no significant relationship between grit, interpersonal such as listening skills, emotional intelligence and communicating in groups, and adaptability such as self-awareness, personal management, problem-solving and knowledge of competencies and Mathematics performance while there is a significant relationship between intrapersonal and adaptability such as attitude and Mathematics performance.

Keywords **– Non-cognitive Skills and Mathematics Performance.**

I. INTRODUCTION

Education plays an important role to every individual because it equips a person with the necessary knowledge and skills needed to become a functional member of the society. The World Bank stated that education could also be one of the strongest instruments for reducing poverty, thereupon improving the well-being of the people [1] and to establish and maintain a high-quality education system, proper investments must be made [2] More so, there is a need to highlight the competence of students in subjects that prepares them for the world, including Mathematics. Mathematics is one subject that pervades life at any age and in any circumstance. Thus, its value goes beyond the classroom and the school. Mathematics as a school subject, therefore, must be learned comprehensively and with much depth [3].

In Philippine Education, students' low performance in Mathematics is one of the leading and besetting problems in the academe. Imam, et. al. stated that the alarming performance of the Filipino students in Mathematics locally, nationally and internationally necessitates urgent decisions and actions from all education sectors [4]. Nationally, they showed poor mastery in Science and Mathematics as evidenced by the results in the 2003 to 2009 National Achievement Tests [5].

The low performing outcomes reflect in the performance of students across all public schools in the Schools Division of Cabuyao specifically in Gulod National High School, thus, the researcher determined the relation of non-cognitive skills of Grade 8 students with their performance in Mathematics.

II. METHODOLOGY

The methodology section discusses the research design used, the respondents of the study, the instrument utilized in the investigation, the data – gathering procedure adopted, and the statistical treatments used.

2.1. Research Design

The research design used was descriptive-correlational type through survey questionnaire and Mathematics Assessment Tool to gather data and information on the relationship of non-cognitive skills to students' performance in Mathematics. Descriptive research involves collection of data in order to test the hypothesis or to answer questions concerning the current status of the study.

2.2. Respondents of the Study

This study was limited only to 447 from a population of 545 Grade 8 junior high school students who serve as respondents of the study. The said respondents were enrolled at Gulod National High School, City Schools Division of Laguna during the School Year 2018 - 2019.

The distribution of respondents when grouped according to sex is shown in Table 1.

Table 1. Sex Distribution of Respondents.

Sex	Frequency	Percent
Male	220	49.2
Female	227	50.8
Total	**447**	**100**

From the 447 respondents, 220 or forty-nine and two tenths percent (49.2%) were males while 227 or fifty and eight tenths percent (50.8%) of the respondents were females. This entails that female respondents are greater in the study than the male respondents.

The Age Distribution of the Respondents of the study was shown in Table 2.

Table 2. Age Distribution of Respondents

Age	Frequency	Percent
12	1	0.2
13	177	39.6
14	212	47.4
15	38	8.5
16	17	3.8
17	2	0.4
Total	**447**	**100**

As depicted in the figure, the student-respondents of this study consisted of as young as 12 years old and as old as 17 years old, with 1 (0.2%) and 2 (0.4%) students respectively. It could also be seen in the figure that 47.4% or almost half of the population were aged fourteen. This led the researcher to believe that majority of the respondents were young and have not attained a sense of emotional maturity. Seemingly, the younger the respondents were, the more likely that they were able to cope with meeting increasingly rigorous academic activities.

2.3. Research Instrument

The instruments measured the respondent's non-cognitive skills such as grit, intrapersonal skills, interpersonal skills, and adaptability while the assessment tool in Mathematics 8 measured the level of Mathematics performance of the respondents. The instruments and assessment tool used in this study were adopted from different sources [6, 10, 11, 12] and were revised to meet the required answers to the problems of the study. The modified questionnaire and assessment tool in Mathematics 8 were validated by pool of experts composed of Guidance Counselors and Licensed Psychologists, and Mathematicians respectively.

The survey questionnaire on non-cognitive consisted of five parts. These parts were prepared to solicit information regarding the demographic profile of respondents, and non-cognitive skills as to grit, intrapersonal skills, interpersonal skills, and adaptability. Part I was composed of Demographic profile of respondents as to gender and age. Part II was composed of Grit Self Assessment, Part III consisted of Intrapersonal Skills, Part IV was composed of Interpersonal Skills which include listening skills, emotional intelligence, and communicating in groups. Lastly, Part V was composed of Adaptability Assessment Test which included self-awareness, personal management, problem-solving and decision-making, and knowledge of competencies. Part II, III, IV, and V were answered by the respondents based on their experiences in Mathematics class.

The research instrument on Grit was adopted from Duckworth, et. al.[6]. To test its validity, it was designed based on the original 12-item Grit Scale (Grit-O) with a two-factor structure that was not initially tested for differential predictive validity of the two factors in the Grit-O. Duckworth and Quinn [7] conducted six studies to construct and validate the Short Grit Scale (Grit-S). In their first study Duckworth and Quinn kept the two-factor structure for the Grit-S and identified the items for the Grit-S with the best overall predictive validity across four samples originally used by Duckworth et al. [6]. In the second study, Duckworth and Quinn [7] used confirmatory factor analysis to test the two-factor structure of the Grit-S instrument in a sample of 1,554 adults, examined the relationships between the Grit-O, the Grit-S, and the Five Factor Model (FFM) of personality traits, and explored predictive validity for career changes and educational attainment. The third study validated an informant version of the Grit-S and established consensual validity. The fourth study was used to examine test-retest reliability of the Grit-S in a sample of adolescents, and the fifth and sixth studies investigated the predictive validity of the Grit-S in a sample of West Point cadets and National Spelling Bee finalists respectively. Duckworth and Quinn confirmed both predictive validity and consensual validity for the Grit-S across a wide range of subjects in the six different studies of the Grit-S [8].

To affirm its reliability, the Short Grit Scale (Grit-S) of Duckworth, et. al. [6] has been carefully examined for internal consistency and test-retest reliability [7]. In a series of six studies designed to test the validity and reliability of the Grit-S, internal consistency and test-retest reliability were found to be stable. In their fourth study, the sample had an internal reliability coefficient of $\propto = 0.81$. This was followed by an internal reliability coefficient of $\propto = 0.80$ in the fifth study conducted by Duckworth, et. al [8].

The reference scale for grit is shown in Table 3. It shows the range, verbal scale and descriptive interpretation. It was adopted from the study of Garcia, et. al, [9].

Table 3. Reference Scale for Grit

Range	Descriptive Scale	Descriptive Interpretation
4.50– 5.00	Very much like me	Extremely Gritty (Distinguished by an immense perseverance and passion for long term goals.)
3.50– 4.59	Mostly like me	Most likely gritty (Distinguished by having high passion and perseverance for long term goals but can be discouraged by setbacks.)
2.50– 3.49	Somewhat like me	Somewhat gritty (Distinguished by having an average passion and perseverance for long term goals but can be discouraged by setbacks.)
1.50– 2.49	Not much like me	Not much gritty

		(Distinguished by having low passion and perseverance for long term goals and can easily be discouraged by setbacks.)
1.00– 1.49	Not like me at all	Not at all gritty (Distinguished by having no passion and perseverance for long term goals.)

The questionnaire on intrapersonal skills was adopted from a website named 3SmartCubes [10]. A reliability analysis was carried out on intrapersonal skills scale comprising 14 items. Cronbach's alpha showed the questionnaire reach acceptable reliability, $\propto = 0.741$ (Acceptable).

The reference scale for Intrapersonal skills is shown in Table 4.

Table 4. Reference Scale for Intrapersonal

Range	Descriptive Scale	Descriptive Interpretation
4.50 – 5.00	Strongly agree	Very high level
3.50 – 4.59	Agree	High level
2.50 – 3.49	Not sure	Average level
1.50 – 2.49	Disagree	Fair level
1.00 – 1.49	Strongly disagree	Poor level

The questionnaire on interpersonal skills was adopted from Jones, et. al. [11]. A reliability analysis was carried out on interpersonal skills (Listening skills, emotional intelligence, communicating in Groups) scale comprising 32 items. Cronbach's alpha showed the questionnaire reach questionable reliability, $\propto = 0.726$ (Acceptable).

The reference scale for Interpersonal skills was shown in Table 5.

Table 5. Reference Scale for Interpersonal

Range	Descriptive Scale	Descriptive Interpretation
4.50 – 5.00	Always or nearly always	Very high level
3.50 – 4.59	Often	High level
2.50 – 3.49	Sometimes	Average level
1.50 – 2.49	Rarely	Fair level
1.00 – 1.49	Never or hardly ever	Poor level

The questionnaire on adaptability was adopted from Morgan [12]. A reliability analysis was carried out on adaptability skills scale comprising 28 items. Cronbach's alpha showed the questionnaire reach excellent reliability, $\propto = 0.901$.

The reference scale for Intrapersonal skills is shown in Table 6.

Table 6. Reference Scale for Adaptability

Range	Descriptive Scale	Descriptive Interpretation
4.50 – 5.00	Always	Very high level (With seriously bendable abilities.)
3.50 – 4.59	Frequently	High level (With seriously bendable abilities.)
2.50 – 3.49	Sometimes	Average level of adaptability skill (Will do Ok in Yoga, but need to work on one self.)
1.50 – 2.49	Seldom	Fair level (Start increasing a range of motion today.)
1.00 – 1.49	Never	Poor level (Need serious help.)

The questionnaires on Intrapersonal, Interpersonal, and Adaptability were validated by Sarah Joy A. Zuñiga, Teacher III and Guidance Coordinator of Gulod National High School, Hanzen M. Reyes, MSP, RPsy, RPm, Professor of Pamantasan ng Cabuyao, and Raul A. Lapaz, RPsy, Professor of St. Vincent College of Cabuyao.

Meanwhile, the assessment tool in Mathematics 8 was adopted from the diagnostic test questionnaire made by the selected Mathematics Teachers of Department of Education, City Schools Division of Cabuyao namely: Rona V. Justado (Pulo NHS) and Jovelyn M. Limpiada (Pulo NHS) in the school year 2018-2019. The said test questionnaire was validated by the teachers and coordinators in Mathematics of different schools namely: Michelle C. Nequinto (Gulod NHS), Romeo Gareza (Gulod NHS), Michael R. Bayle (Cabuyao INHS), Hermes Hermano Jr.(Cabuyao INHS), Cleo A. Quimson (Pulo NHS), Nickson T. Derraco (Pulo NHS), and Yolly D. Valiente (Southville 1 INHS). This was approved by Aida V. Maraña, PSDS-In-Charge for Mathematics, Dr. Alberto P. Labigan, EPS in Mathematics, and Dr. Edna F. Hemedez, OIC Chief of Curriculum Implementation Division.

The reference scale for mean score in the said assessment in Mathematics 8 is shown in Table 7 [13].

Table 7. Reference Scale for Mean Score

Range	Descriptive Interpretation
32.00 – 40.00	Excellent
24.00 – 31.99	Very Satisfactory
16.00 – 23.99	Satisfactory
8.00 – 15.99	Fair
0.00 – 7.99	Needs Improvement

A reliability analysis was carried out on the Assessment Tool comprising 40 items. Cronbach's alpha showed the questionnaire reached acceptable reliability, $\propto = 0.719$ (Acceptable).

III. RESULTS AND DISCUSSION

This section shows the presentation, analysis and interpretation of the data gathered from the Grade 8 student-respondents of Gulod National High School, City of Cabuyao, Laguna, Philippines in determining the relationship between non-cognitive skills and Mathematics performance.

Table 8 presents the distribution of responses and mean scores for the level of grit of the respondents.

Table 8. Distribution of Mean Level of Grit of Respondents

Statement	*Mean*	*SD*	Descriptive Interpretation
1. Setbacks (hindrances) do not discourage me.	3.13	1.03	Somewhat Gritty
2. I am a hard worker.	3.38	1.00	Somewhat Gritty
3. I finish what I begin.	3.63	0.99	Most Likely Gritty
4. I am diligent.	3.25	0.98	Somewhat Gritty
5. New ideas and projects sometimes distract me from previous ones.	3.38	1.09	Somewhat Gritty
6. I have been obsessed with a certain idea or project for a short time but later lost interest	3.20	1.10	Somewhat Gritty
7. I often set a goal but later choose to pursue a different one	3.24	1.09	Somewhat Gritty
8. I have difficulty maintaining my focus on projects that take more than a few months to complete.	3.12	1.22	Somewhat Gritty
Overall	**3.29**	**0.49**	**Somewhat Gritty**

Legend: 4.50 – 5.00 = Extremely Gritty; 3.50 – 4.59 = Most Likely Gritty; 2.50 – 3.49 = Somewhat Gritty; 1.50 – 2.49 = Not Much Gritty; 1.00 – 1.49 = Not at all Gritty

In Table 8, the statement that got the highest mean score of 3.63, with a verbal interpretation of "Most Likely Gritty", was the statement "I finish whatever I begin'. The statement that had the lowest mean score of 3.13 with a verbal interpretation of "Somewhat Gritty" was the statement "I have difficulty maintaining my focus on projects that take more than a few months to complete". Overall, the weighted mean was 3.29 with an interpretation of "Somewhat Gritty". This signifies that respondents have an average passion and perseverance for long term goals but can be discouraged by setbacks. The overall standard deviation (SD = 0.49) on grit showed that the individual responses of student-respondents, on average, were 0.49 away from the overall mean ($\bar{X}$ = 3.29).

This study was similar to the results of Donald Gamble's study which indicated that the students, Grade 11 and 12 student-respondents, had a mean level of grit ($\bar{X}$ = 3.50) indicating responses on the Likert-style scale directly between "Somewhat like me" and "Mostly like me." These results indicate the Cristo Rey Network students have a significant amount of grit. Based on his study, Cristo Rey Network students are gritty and this finding is significant with regards to the students' capability to function in the corporate workplace experienced in the Corporate Work-Study Program [8].

This was also similar to the result of the study of Garcia, et. al. wherein the level of grit of respondents were "somewhat gritty", which implied that they have an average passion for long term goals but can be brought down by setbacks. In the relationship of grit and General Weighted Average, as the level of grit increases, there is a tendency for the respondents' grades to increase [9].

Shown in Table 9 is the distribution of responses and mean scores for the level of intrapersonal skill of the respondents.

Table 9. Distribution of Mean Level of Intrapersonal Skill of Respondents

Statement	*Mean*	*SD*	Descriptive Interpretation
1. I do not always comprehend why I react in the way I do	3.39	0.85	Average
2. I am good at telling my feelings	3.55	1.17	High level
3. When I am angry, I find it easy to calm myself down	3.74	1.06	High level
4. My emotions tell me about changes I should make in my life	3.82	0.99	High level
5. I never base my own life choices on my emotions	3.26	0.99	Average level
6. I am well aware of both my strengths and weaknesses.	3.62	1.03	High level
7. I am very independent and self directed. I don't like being told what to do.	3.21	0.99	Average level
8. I like learning more about myself and my inner psychology	3.89	1.01	High level
9. I am a unique, original person - and I like being that way.	3.86	0.97	High level
10. If I am feeling bad, I am usually able to discover the root of my negative emotions.	3.42	1.6	High level
11. I spend a lot of time thinking about life and reflecting on my place in the world.	3.76	0.95	High level
12. I prefer to undertake projects alone. I like flying solo.	3.33	1.03	Average level
13. I have a very idealistic outlook on life - and it's always developing.	3.49	0.90	Average level
14. I am motivated and confident in my own abilities.	3.80	0.98	High level
Overall	**3.58**	**0.41**	**High level**

Legend: 4.50 – 5.00 = Very High level; 3.50 – 4.59 = High level; 2.50 – 3.49 = Average level; 1.50 – 2.49 = Fair level;

1.00 – 1.49 = Poor level

In Table 9, the statement that got the highest mean score of 3.89, with a descriptive interpretation of "High Level", was the statement "I like learning more about myself and my inner psychology". The statement that has the lowest mean score of 3.21 with a descriptive interpretation of "Average level" was the statement "I am very independent and self directed. I don't like being told what to do". Overall, the weighted mean was 3.58 with a descriptive interpretation of "High Level". This signifies that respondents have attained a high level or sense of internal skills, perceptions and attitude, i.e. self-confidence, being patient, self-esteem and self – reliant and high regard for oneself. The overall standard deviation (SD = 0.41) on intrapersonal showed that the individual responses of student-respondents, on average, were 0.41 away from the overall mean ($\bar{X}$ = 3.58).

The mean score for intrapersonal in this study was higher than the results of the study of Donald Gamble which showed that the students recorded a mean score for intrapersonal ($\bar{X}$ = 13.47) below the middle point subscale value of 15 near the choice "Just a little true of me". The standard deviation for intrapersonal in Gamble's study was 4.10 [8].

In the same light, London stated that skilled intrapersonal communicators can turn around a negative thought pattern and use it to bring fresh and inspiring ideas into their day. Attitude is everything when dealing with negativity and with practice, one can banish negative thoughts from a person's mind, brightening up his/her days and providing a fresh way of looking at things. Having compassion for others is an intrapersonal skill that allows a person to see things from the perspective of others, and is important for teachers, team leaders and anyone working closely with other people [14].

Table 10 shows the distribution of the mean level of Interpersonal – Listening Skills of Respondents.

Table 10. Distribution of Mean Level of Interpersonal – Listening Skills of Respondents

A. Listening Skills	*Mean*	*SD*	Descriptive Interpretation
1. I am often thinking of something witty to say in response while listening.	3.54	0.86	High level
2. I sit and listen with my legs and arms folded in front of me.	3.34	1.09	Average level
3. I will interrupt the speaker if I disagree with a statement they have made.	2.91	1.08	Average level
4. I try to have the last word on a subject.	3.00	1.02	Average level
5. I offer verbal signals while listening, things like, 'Go on…' or 'Uh huh' to encourage the speaker to continue.	3.31	1.16	Average level
6. When I have something to contribute to a conversation, I'll interrupt the speaker to make my point.	3.03	1.05	Average level
7. When communicating with others, I pay attention to non-verbal signals – body language, facial expressions and gestures.	3.27	1.07	Average level
8. I get bored with conversations easily - most people have nothing interesting to say.	3.36	1.16	Average level
9. I nod my head and use other gestures and facial expressions to show that I'm interested in what is being said.	3.56	1.05	High level
10. I make eye contact with others while listening.	3.47	1.22	Average level
Overall (Listening Skills)	**3.28**	**0.51**	**Average Level**

Legend: 4.50 – 5.00 = Very High level; 3.50 – 4.59 = High level; 2.50 – 3.49 = Average level; 1.50 – 2.49 = Fair level; 1.00 – 1.49 = Poor level

In Table 10, the statement that got the highest mean score of 3.56, with a descriptive interpretation of "High Level", was the statement "I nod my head and use other gestures and facial expressions to show that I'm interested in what is being said". The statement that has the lowest mean score of 2.91 with a descriptive interpretation of "Average level" was the statement "I will interrupt the speaker if I disagree with a statement they have made". The weighted mean on interpersonal – listening skills of respondents was 3.28 with a descriptive interpretation of "Average Level" while the overall standard deviation was 0.41. This signifies that respondents have attained an average level of listening skills. The overall standard deviation (SD = 0.51) on interpersonal – listening skills showed that the individual responses of student-respondents, on average, were 0.51 away from the overall mean ($\bar{X}$ = 3.28).

The distribution of the mean level of Interpersonal – Emotional Intelligence of Respondents is shown in Table 11.

Table 11. Distribution of Mean Level of Interpersonal – Emotional Intelligence of Respondents

B. Emotional Intelligence	*Mean*	*SD*	Descriptive Interpretation
11. I am content with who I am.	4.25	0.97	High level
12. I avoid difficult conversations and confrontations.	3.44	0.94	Average level
13. I'm frequently self-critical of my mistakes.	3.49	1.01	Average level
14. I understand and respect the views of others – even if they are different to my views.	3.88	1.00	High level
15. I am confident about my existing skills and abilities and willing to learn new ones.	3.95	1.07	High level
16. I find it difficult to make new friends.	3.47	1.23	Average level
17. I can tell when someone doesn't understand what I'm saying.	3.48	1.06	Average level
18. In a group situation I generally know how the members feel about each other.	3.55	0.98	High level
19. I am usually a good judge of character.	3.26	0.95	Average level
20. I can interpret the mood of others when I communicate	3.60	1.01	High level

with them.			
Overall (Emotional Intelligence)	**3.64**	**0.49**	**High Level**

Legend: 4.50 – 5.00 = Very High level; 3.50 – 4.59 = High level; 2.50 – 3.49 = Average level; 1.50 – 2.49 = Fair level; 1.00 – 1.49 = Poor level

In Table 11, the statement that got the highest mean score of 4.25, with a descriptive interpretation of "High Level", was the statement "I am content with who I am". The statement that has the lowest mean score of 3.26 with a descriptive interpretation of "Average level" was the statement "I am usually a good judge of character". The weighted mean on Interpersonal – Emotional Intelligence was 3.64 with an interpretation of "High Level" while the overall standard deviation was 0.49. It shows that the individual responses of respondents, on average, was 0.49 away from the overall mean ($\bar{X}$ = 3.64).

Table 12 shows the distribution of the mean level of Interpersonal – Communicating in Groups of Respondents.

Table 12. Distribution of Mean Level of Interpersonal – Communicating in Groups of Respondents

C. Communicating in Groups	*Mean*	*SD*	Descriptive Interpretation
21. I feel comfortable and confident.	3.69	0.97	High level
22. I do not usually say much when in a group of people.	3.27	0.96	Average level
23. I feel like I'm an outsider.	2.94	1.15	Average level
24. In a meeting or classroom situation I prefer to sit at the back.	3.33	1.16	Average level
25. I can dominate a group and tend to do the majority of the talking.	3.19	1.00	Average level
26. I participate.	3.81	0.97	High level
27. I make new friends easily and generally get on well with people I have just met.	3.40	1.12	Average level
28. I avoid giving other people eye contact in group situations.	3.14	1.03	Average level
29. I worry about what to say when talking to others.	3.36	1.03	Average level
30. I am nervous about having to answer a question in front of a group of people.	3.66	1.04	High level
31. I find it easy to fit into most group situations.	3.23	0.93	Average level
32. I avoid group situations whenever possible.	2.92	1.08	Average level
Overall (Communicating in Groups)	**3.33**	**0.45**	**Average Level**

Legend: 4.50 – 5.00 = Very High level; 3.50 – 4.59 = High level; 2.50 – 3.49 = Average level; 1.50 – 2.49 = Fair level; 1.00 – 1.49 = Poor level

In Table 12, the statement that got the highest mean score of 3.81, with a descriptive interpretation of "High Level", was the statement "I participate". The statement that has the lowest mean score of 2.92 with a descriptive interpretation of "Average level" was the statement "I avoid group situations whenever possible". The weighted mean on Interpersonal – Communicating in Groups was 3.33 with an interpretation of "Average Level" while the overall standard deviation was 0.45. It shows that the individual responses of respondents, on average, was 0.45 away from the overall mean ($\bar{X}$ = 3.33).

Table 13 shows the distribution of the overall mean level of interpersonal skills of respondents.

Table 13. Distribution of Overall Mean Level of Interpersonal Skills of Respondents

Interpersonal Skills	*Mean*	*SD*	Descriptive Interpretation
A. Listening Skills	3.28	0.51	Average Level
B. Emotional Intelligence	3.64	0.49	High Level
C. Communicating in Groups	3.33	0.45	Average Level
Overall (Interpersonal Skills)	**3.42**	**0.48**	**Average Level**

Legend: 4.50 – 5.00 = Very High level; 3.50 – 4.59 = High level; 2.50 – 3.49 = Average level; 1.50 – 2.49 = Fair level; 1.00 – 1.49 = Poor level

In Table 13, Emotional Intelligence got the highest mean ($\bar{X}$ = 3.64) with an interpretation of "High level" while Listening Skills got the lowest mean ($\bar{X}$ = 3.28) with an interpretation of "Average level". The table revealed that the respondents had shown an "Average Level" of Interpersonal Skill with overall mean of 3.42. Interpersonal skills refer to students' social-awareness and interpersonal relationship as to expressing empathy, social responsibility, and interpersonal relationship. The overall standard deviation (SD = 0.48) shows that the individual responses of respondents, on average, was 0.48 away from the overall mean ($\bar{X}$ = 3.42).

The results of Donald Gamble's study indicated the students had a mean level or mean scores for interpersonal ($\bar{X}$ = 19.24) that placed most student responses for this subscale between the values "Pretty much true of me" and "Very much true of me". The standard deviation for the interpersonal in his study was 3.05 [8].

Matthew Jones stated that good interpersonal skills can improve many aspects of your life, both professionally and socially, as they lead to better understanding and better relationships [15].

As stressed by Francis Kong, good interpersonal skills are often viewed as the foundation for good working and social relationships, and also for developing many other areas of skill. Without good interpersonal skills it is often more difficult to develop other important life skills. Unlike specialised and technical skills (hard skills), interpersonal skills (soft skills) are used every day and in every area of our lives. Thus, the result of the study would affirm that the academic performance of the students in

Mathematics would be affected by the level of intrapersonal skills of the students for they would perform better academically in the subject [16].

Social Norms Theory aims to understand the environment and interpersonal influences (such as peers) in order to change behavior. Peer influence, and the role it plays in individual decision-making around behaviors, is the primary focus of Social Norms Theory. It posits that our behavior is influenced by misperceptions of how our peers think and act. Accordingly, the theory states that correcting misperceptions of perceived norms will most likely result in a decrease in the problem behavior or an increase in the desired behavior. When used correctly, Social Norms Theory can be very effective in changing individual behavior by focusing on changing misperceptions at the group level [17].

The distribution of the mean level of adaptability – Self-awareness of respondents is shown in Table 14.

Table 14. Distribution of Mean Level of Adaptability – Self-awareness of Respondents

A. Self-awareness	*Mean*	*SD*	Descriptive Interpretation
1. I can articulate my special abilities, talents and skills.	3.71	1.02	High level
2. I know what I have to do to regain my confidence when I temporarily lose it.	3.44	1.01	Average level
3. I have a strong sense of self-esteem and generally feel good about myself.	3.53	0.99	High level
4. I can identify and communicate my weaknesses and the ways that I work with or around them.	3.46	0.97	Average level
5. I have a vision for my life that gives it meaning and purpose.	3.74	1.09	High level
6. I know what is important to me and use this knowledge in making decisions.	3.94	1.02	High level
Overall (Self-awareness)	**3.64**	**0.58**	**High Level**

Legend: 4.50 – 5.00 = Very High level; 3.50 – 4.59 = High level; 2.50 – 3.49 = Average level; 1.50 – 2.49 = Fair level; 1.00 – 1.49 = Poor level

In Table 14, the statement that got the highest mean score of 3.94, with a descriptive interpretation of "High Level", was the statement "I know what is important to me and use this knowledge in making decisions". The statement that has the lowest mean score of 3.44 with a descriptive interpretation of "Average level" was the statement "I know what I have to do to regain my confidence when I temporarily lose it". The weighted mean on adaptability – self-awareness of respondents was 3.64 with a descriptive interpretation of "High Level". The overall standard deviation (SD = 0.58) shows that the individual responses of respondents, on average, was 0.58 away from the overall mean ($\bar{X}$ = 3.64).

Table 15 shows the distribution of the mean level of adaptability – personal management of respondents.

Table 15. Distribution of Mean Level of Adaptability – Personal Management of Respondents

B. Personal Management	*Mean*	*SD*	Descriptive Interpretation
7. I take responsibility for managing my studies.	3.85	1.01	High level
8. I can see how my study fits into the bigger picture of my life plans.	3.79	0.99	High level
9. I have a personal financial plan which I evaluate regularly based on my current situation.	3.45	0.98	Average level
10. I have contingency plans, a second option if my first plan doesn't work out.	3.52	1.03	High level
11. I assess my strengths and weaknesses, outline ways to grow, and establish short and long range goals for my studies.	3.67	0.98	High level
Overall (Personal Management)	**3.66**	**0.60**	**High Level**

Legend: 4.50 – 5.00 = Very High level; 3.50 – 4.59 = High level; 2.50 – 3.49 = Average level; 1.50 – 2.49 = Fair level; 1.00 – 1.49 = Poor level

In Table 15, the statement that got the highest mean score of 3.85, with a descriptive interpretation of "High Level", was the statement "I take responsibility for managing my studies". The statement that has the lowest mean score of 3.45 with a descriptive interpretation of "Average level" was the statement "I have a personal financial plan which I evaluate regularly based on my current situation". The weighted mean on adaptability – personal management of student-respondents was 3.66 with a descriptive interpretation of "High Level" while the overall standard deviation was 0.60. Meaning, the individual responses of respondents, on average, was 0.60 away from the overall mean ($\bar{X}$ = 3.66).

Table 16 shows the distribution of the mean level of Adaptability – Problem-solving and Decision-making of Respondents.

Table 16. Distribution of Mean Level of Adaptability – Problem-solving and Decision-making of Respondents

C. Problem-solving and Decision-Making	*Mean*	*SD*	Descriptive Interpretation
12. I have emerged stronger and have learned personal strategies to deal with change because of the changes in my life.	3.73	0.95	High level
13. I can organize my surroundings and prioritize tasks, even in stressful times.	3.49	0.98	Average level
14. I can find and mobilize necessary resources in a crisis or new situation.	3.31	1.00	Average level
15. I can usually think of several alternatives to solving a problem.	3.48	0.94	Average level
16. When experiencing stress in one area of life, I can contain it	3.41	0.98	Average level

within that area.

Overall (Problem-solving and Decision-Making)	**3.48**	**0.61**	**Average level**

Legend: 4.50 – 5.00 = Very High level; 3.50 – 4.59 = High level; 2.50 – 3.49 = Average level; 1.50 – 2.49 = Fair level; 1.00 – 1.49 = Poor level

In Table 16, the statement that got the highest mean score of 3.73, with a descriptive interpretation of "High Level", was the statement "I have emerged stronger and have learned personal strategies to deal with change because of the changes in my life". The statement that has the lowest mean score of 3.31 with a descriptive interpretation of "Average level" was the statement "I can find and mobilize necessary resources in a crisis or new situation". The weighted mean on adaptability – problem-solving and decision-making of respondents was 3.48 with an interpretation of "Average Level" while the overall standard deviation was 0.61. It shows that the individual responses of respondents, on average, was 0.61 away from the overall mean ($\bar{X}$ = 3.48).

Table 17 shows the distribution of the mean level of Adaptability – Attitude of Respondents.

Table 17. Distribution of Mean Level of Adaptability - Attitude of Respondents

D. Attitude	*Mean*	*SD*	Descriptive Interpretation
17. I believe that I always have options and choices, even in difficult situations.	3.86	1.01	High level
18. I generally approach life as an optimist.	3.39	0.88	Average level
19. I have a sense of humor. I can find things to laugh about even in dark times.	3.75	1.02	High level
20. I understand there is growth in new experiences and enjoy learning from them.	3.82	0.98	High level
21. I expect life to have ups and downs and not always go as I would like it to.	3.71	1.00	High level
22. I don't spend time worrying about things that are out of my control.	3.36	1.09	Average level
Overall (Attitude)	**3.65**	**0.60**	**High Level**

Legend: 4.50 – 5.00 = Very High level; 3.50 – 4.59 = High level; 2.50 – 3.49 = Average level;1.50 – 2.49 = Fair level; 1.00 – 1.49 = Poor level

In Table 17, the statement that got the highest mean score of 3.86, with a descriptive interpretation of "High Level", was the statement "I believe that I always have options and choices, even in difficult situations". The statement that has the lowest mean score of 3.36 with a descriptive interpretation of "Average level" was the statement "I don't spend time worrying about things that are out of my control". The weighted mean on adaptability – attitude of respondents was 3.65 with a descriptive interpretation of "High Level" while the overall standard deviation was 0.60. It shows that the individual responses of respondents, on average, was 0.60 away from the overall mean ($\bar{X}$ = 3.65).

Table 18 shows the distribution of the mean level of Adaptability – Attitude of Respondents.

Table 18. Distribution of Mean Level of Adaptability – Knowledge of Competencies of Respondents

E. Knowledge of Competencies	*Mean*	*SD*	Descriptive Interpretation
23. I would describe myself as a continuous learner.	3.90	0.90	High level
24. I regularly spend time keeping my knowledge and skills current.	3.61	0.89	High level
25. I know the skills that will be required in my studies in the next several years.	3.85	0.93	High level
26. I know what others in our class expect of me.	3.48	1.02	Average level
27. I know how my current skills are viewed by my teachers and classmates.	3.54	0.90	High level
28. I know which behaviors and attitudes are rewarded in our class.	3.61	0.99	High level
Overall (Knowledge of Competencies)	**3.66**	**0.59**	**High Level**

Legend: 4.50 – 5.00 = Very High level; 3.50 – 4.59 = High level; 2.50 – 3.49 = Average level;1.50 – 2.49 = Fair level; 1.00 – 1.49 = Poor level

In Table 18, the statement that got the highest mean score of 3.90, with a descriptive interpretation of "High Level", was the statement "I would describe myself as a continuous learner". The statement that has the lowest mean score of 3.48 with a descriptive interpretation of "Average level" was the statement "I know what others in our class expect of me". The weighted mean on adaptability – knowledge of competencies of respondents was 3.66 with an interpretation of "High Level" while the overall standard deviation was 0.59. It shows that the individual responses of respondents, on average, was 0.59 away from the overall mean ($\bar{X}$ = 3.66).

The distribution of the overall mean level of Adaptability – Attitude of Respondents is shown in Table 19.

Table 19. Distribution of Overall Mean Level of Adaptability of Respondents

Adaptability	*Mean*	*SD*	Descriptive Interpretation
A. Self-awareness	3.64	0.578	High Level
B. Personal Management	3.66	0.60	High Level
C. Problem-solving and Decision-making	3.48	0.61	Average level
D. Attitude	3.65	0.60	High Level

E. Knowledge of Competencies	3.66	0.59	High Level
Overall (Self-awareness)	**3.64**	**0.58**	**High Level**

Legend: 4.50 – 5.00 = Very High level; 3.50 – 4.59 = High level; 2.50 – 3.49 = Average level; 1.50 – 2.49 = Fair level; 1.00 – 1.49 = Poor level

In Table 19, Personal Management and Knowledge in Competencies both got the highest mean ($\bar{X}$ = 3.66) with an interpretation of "High level" while Problem-solving and Decision-Making got the lowest mean ($\bar{X}$ = 3.48) with an interpretation of "Average level". The overall mean of the adaptability level of the respondents was 3.62 with a descriptive interpretation of "High Level" of Adaptability which means that the student-respondents have "seriously bendable abilities". The overall standard deviation (SD = 0.60) shows that the individual responses of respondents, on average, is 0.5973 way from the overall mean ($\bar{X}$ = 3.62).

The research of Gamble showed that the mean score of adaptability is 16.05 which is above the middle point Emotional Social Intelligence (ESI) subscale value of 15 and just below the choice "Pretty much true of me." The standard deviation for adaptability in his study was 3.46 [8].

Studies show that people who were highly adaptable may be more highly valued than those who are highly skilled but less willing to adapt, flex, and change. Martin, et. al. found that young people who are more adaptable were more likely to participate in class, enjoy school, be more satisfied with life, have higher self-esteem, and have a more concrete sense of meaning and purpose in life [18].

The researchers, Collie and Martin, found that when students are more adaptable in Mathematics, they also tend to be more engaged in the subject. They also found that when students are more adaptable, they tend to attain higher achievement (even after they accounted for students' prior achievement). They found out that adaptability is a potent factor in academic and non-academic outcomes. They concluded from this that when students are more adaptable this is important for their engagement and achievement in Mathematics [19].

Jean Piaget's theory claims that adaptation is one of the processes guiding cognitive development. The adaptation process itself can occur in two ways: through assimilation and accommodation. In assimilation, people take in information from the outside world and convert it to fit in with their existing ideas and concepts. In accommodation, people also accommodate new information by changing their mental representations to fit the new information [20].

Taking the time to develop a person's soft skills such as adaptability and flexibility will give him or her additional opportunities in any endeavour, as in this study, the academic performance in Mathematics of the respondents.

Table 20 shows the Mathematics Performance of the respondents of the study.

Table 20. Mathematics Performance of Respondents

	Mean	*SD*	Descriptive Interpretation
Mathematics Performance	16.38	5.65	**Satisfactory**

Legend: 32.00 – 40.00 = Excellent; 24.00 – 31.99 = Very Satisfactory; 16.00 – 23.99 = Satisfactory; 8.00 – 15.99 = Fair; 0.00 – 7.99 = Needs Improvement

It could be observed in Table 20 that the standard deviation was 5.65 which indicated that the data points were spread out over a large range of values. The weighted mean of 447 student-respondents' Mathematics performance was 16.38 with a verbal interpretation "Satisfactory". This means that the student-respondents had the average level of Mathematics performance. The equivalent Mean Percentage Score was (MPS) 40.94%.

Mathematics is one of the major subjects in the curriculum, thus, it is necessary that the students must acquire a High Level or Very Satisfactory Level of Academic Performance. Though it could be seen on the legend that the Fair Level would be 15.99, and it revealed only a difference of 0.39, a very small difference that it could adjudged as Fair, it would mean that the academic performance of the respondents needs a lot of improvement and polishing.

Table 21 shows the significant relationship of Non-cognitive skills to Mathematics performance of the respondents.

Table 21. Significant Relationship of Non-cognitive Skills to Mathematics Performance

Independent Variables	*Pearson Correlation*
A. Grit	0.051
B. Intrapersonal	-0.122**
C. Interpersonal	
1. Listening Skill	-0.045
2. Emotional Intelligence	-0.060
3. Communicating in Groups	-0.035
D. Adaptability	
1. Self-awareness	-0.085
2. Personal Management	-0.078
3. Problem-solving and Decision-making	-0.076
4. Attitude	-0.094*
5. Knowledge of Competencies	-0.044

n = 447

*Legend: -1.0 - -0.5 or 0.5 – 1.0 = Strong correlation; -0.5 - -0.3 or 0.3 – 0.5 = Moderate correlation; -0.3 - -0.1 or 0.1 – 0.3 = Weak correlation; -0.1 – 0.1 = None or very weak correlation; **p-value ≤0.01; *p≤0.05*

Table 21 shows that Intrapersonal has a Pearson Correlation of – 0.122 ($p<0.01$) and Adaptability, i.e. Attitude, has a Pearson Correlation of – 0.094 ($p<0.01$). This implies that Intrapersonal and Attitude are found to be inversely related to Mathematics performance. Meaning, as the level of one variable increases the level of other decreases. The Intrapersonal skill of respondents was highly significantly related and the Attitude was significantly related to the Mathematics Performance. However, the other independent variables such as grit, interpersonal listening skills, emotional intelligence, communicating in groups, self-awareness, personal management, problem-solving and decision-making, and knowledge of competencies have weak or no significant relationship with the dependent variable.

Farrington, et. al., stated that the University of Chicago's Consortium on Chicago School Research concluded that the non-cognitive skills most strongly associated with academic performance are academic behaviors like going to class and participating, academic perseverance namely grit and self-discipline, academic mindsets (e.g. feeling a sense of belonging within an academic community and believing that ability and competence can grow with effort), learning strategies (e.g. metacognitive strategies and goal-setting), and social skills (e.g. interpersonal skills and cooperation) [21].

Jennifer Lewis Bell's study on "An Examination of Cognitive and Non-cognitive Factors and Academic Success in the Pre-Engineering Curriculum at a Four-Year Southeastern University" explained that non-cognitive factors were found to have a relationship with cognitive factors and were also found to have a significant contribution to the academic success of the participants [22].

This study contradicted the study of Garcia, et. al. entitled "Correlation of the Academic Performance and Grit Among the College of Arts and Sciences Batch 2014 Students of Lyceum of The Philippines-Laguna". Their study revealed that there was a direct relationship between the level of grit and the General Weighted Average of 55 respondents. This implies that as the level of grit increases, there is a tendency for the respondents' grades to increase. Hence, the more the respondents persevere and maintain their passion for their goals, the more they exert effort that leads them to better grades [9].

Table 22. Proposed Action Plan in Mathematics 8, SY: 2019 - 2020

Area	Objectives	Activities	Time Frame	Persons Involved	Materials Needed	Success Indicator
STUDENT DEVELOPMENT IN MATHEMATICS 8	1. Identify the students' level of understanding in Mathematics	Conduct a Numeracy Test	June to August, 2019	All Grade 8 students, Math Teachers, Head Teacher, Principal	Questionnaires	Determined the number of numerate students
	2. Help students develop their critical thinking and mathematical ability	MTAP Program	August to September, 2019	Math 8 Teachers and students	MTAP Materials and handouts	Determine the students with better performance in Mathematics
	3. Develop students' skills and critical thinking through Problem-solving	Math Class Literacy Program	September, 2019 to March, 2020	Selected Grade 8 students per section, Math 8 Teachers, Head Teacher, Principal	Books, Handouts	Students learned the process and the appropriate manner in solving Math problems
	4. Help students develop their talents and Math skills through making Math-related Jingles, and artworks, and participating in school-based Math competitions, i.e. Quiz Bee, Tangrams, Tower of Hanoi, Rubik's Cube, etc.	Math Camp	December, 2019 to January, 2020	All Grade 8 students, Parents of students, Math 8 Teachers, Head Teacher, Principal	Cardboard, Questionnaire for Quiz Bee, Tower of Hanoi material, Rubik's cube and timer, Tangrams	Students create and apply their learning through quiz bee, presentation of jingles, making pieces of art, etc. in relation to Math
	5. Assess the academic performance of students per Quarter	Diagnostic, Periodical, and Achievement Tests in Math 8	Year Round	All Grade 8 students, Math 8 Teachers, Head Teacher, Principal	Test Questionnaires	1. Improved Math Performance from Diagnostic to Achievement test; 2. Selected students with poor performance for remediation
	6. Conduct PTA Meetings and Consultation, and Home visitation for students with poor performance in Math	Quarterly PTA Meeting, Parent-Teacher Conference	Year Round	All Grade 8 students, Parents of students, Math 8 Teachers, Head Teacher, Principal		Parents were aware and informed of the Math performance of their children

Based on the results of the study, the researcher proposed an Action Plan that would address the issues of intrapersonal and attitude, and Mathematics performance of the students. The action plan would encourage the learners to develop their intrapersonal

skills and attitude, as well as their Mathematics performance. Various interactive activities would be participated by the learners to develop their intrapersonal skill and attitude so that the issue of the result of the study would be addressed.

Table 22 shows the proposed Action Plan in Mathematics 8 for the school year 2019 – 2020. The objectives, activities, time frame, persons involved, materials needed, and success indicators were indicated in the table and its ultimate output is the development of Grade 8 students in Mathematics.

The first objective was to identify the students' level of understanding in Mathematics 8. This can be done by conducting a Numeracy Test so that students who are numerate and non-numerate will be determined. Thus, the teacher would be able to make some remediation on the least specific subject matter for those who are non-numerate. This would be done on June to August, 2019.

The second objective was to help Grade 8 students develop their critical thinking and mathematical ability by conducting MTAP Saturday Math Program in order to determine the students with better performance in Mathematics. This program usually starts from August and ends in September in DepEd City Schools Division of Cabuyao. Participants of this program would acquire skills and techniques, and improve their critical thinking and mathematical ability on how to solve Math problems. Thus, the teacher would be able to determine who among the participants would be sent for Division-level MTAP competition. In this program differentiated instruction, the use of manipulative materials, game-like activities, and cooperative learning strategies are applied in order that the subject matter will be both learned and enjoyed by the participants. Thus, it is expected that students have learned the process and the appropriate manner in solving Math problems. However, this program is not mandatory for all the students and this is only for students who are willing to participate with their parents' consent. Therefore, students who would participate in this program are the only ones who would acquire the skills and whose critical thinking would be developed.

The third objective was to develop students' skills and critical thinking through Problem-solving by conducting Literacy Program for selected students. The participants would be taught of the competencies in Mathematics wherein selected students would learn the skills in advance and later, they would serve as group leaders and helpers of their classmates in performing the group activities. They could help and guide their classmates, especially the slow learners, on how to solve certain problems in Mathematics. As an expected outcome, students would have learned the process and the appropriate manner in solving Math problems. This program would be done from September, 2019 to March, 2020.

Fourth, to help students develop their talents and Math skills through making Math-related Jingles, and artworks, and participating in school-based Math competitions, i.e. Quiz Bee, Tangrams, Tower of Hanoi, Rubik's Cube, etc. Grade 8 students from different sections would be encouraged to participate in the said competitions so that their intrapersonal and interpersonal skills, and adaptability would be developed. In this way, students would have created and applied their learning through quiz bee, presentation of jingles, making pieces of art, etc. in relation to Mathematics. It would be done form December, 2019 to January, 2020.

The fifth one, which is regularly performed by the teachers, is to assess the academic performance of Grade 8 students per quarter, that is, Diagnostic Test, First to Fourth Periodical Tests, and Achievement Test in order to improve Mathematics performances and determine who among the students who will be included in the remediation and which of the least learned competencies in Math are to be taught or reviewed. Thus, the teacher would not move to the next set of lessons unless the subject matter or least learned competencies are being comprehended.

The ultimate one is to conduct PTA Meetings and Consultation, and Home visitation for students with poor performance in Mathematics. This would be done so that the parents would know the mathematical status or ability of their children. They would know if their children have performed better or not in each quarter through this regular endeavour. Thus, both the parents and teachers would have parallel contribution for the development of the learners. If students felt that they are supported and loved by both parents or guardians and teachers, this might somehow fuel their motivation to do more and improve more not only in Math but also in other learning areas.

The proposed Action Plan would be applicable not only for school year 2019 – 2020 but also for the years to come. In performing this plan, it is expected that teachers, with the help and guidance of school heads, are regularly applying the learning they have caught form the trainings and seminars in relation to Mathematics such as The Cooperative Learning Strategies, Differentiated Instruction, Computer-aided Instruction, etc., so that both Intrapersonal and Attitude, and Mathematics performance would improve.

IV. Conclusions

The hypothesis stating that there is no significant relationship between the level of non-cognitive skills as to grit, interpersonal, and adaptability such as self-awareness, personal management, problem-solving and decision-making, and knowledge in competencies, and the Mathematics performance of the Grade 8 students was accepted while the relationship between interpersonal and adaptability such as attitude and Mathematics performance was rejected. This means that there is no significant relationship between non-cognitive skills especially grit, interpersonal, and adaptability such as self-awareness, personal management, problem-solving and knowledge of competencies and Mathematics performance while there is significant relationship between non-cognitive skills especially intrapersonal and adaptability such as attitude and Mathematics performance.

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