

Emotional Intelligence and Analytical Problem-Solving Skills of Students in General Mathematics

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Abstract:- Problem-solving, together with critical thinking, is the core and heart of the study of the mathematics. However, many students struggle with problem-solving, analytical problem solving in particular, due to various emotional circumstances. In this case, students' analytical problem-solving skills may have been affected by their emotional well-being. Thus, the purpose of this research paper was to determine the association between emotional intelligence and analytical problem-solving skills of the senior high school students in General Mathematics and identify which dimensions of emotional intelligence influence students' analytical problem-solving skills. A descriptive–correlational research design was utilized in this study, and it was participated by 219 Grade 11 students. The emotional intelligence survey questionnaire and analytical problem-solving skills test questionnaire were used as instruments. Mean, standard deviation, Pearson-r coefficient, and multiple regression analysis were used to analyze the data. Results of this study revealed that students' emotional intelligence is moderate, which implies that they have poor analytical problem-solving skills. Likewise, it is found that there is a significant relationship between emotional intelligence and analytical problem-solving skills, with only the self-awareness dimension having a substantial impact on students' analytical problem-solving skill. Based on the results and findings, it is recommended that mathematics teachers devise learning activities and performance tasks that will help hone students' analytical problem-solving skills.

Keywords:- *emotional intelligence; analytical problem-solving skills; general mathematics.*

I. INTRODUCTION

One of the core subjects in the K – 12 curricula of the current educational system of the Philippines is Mathematics. It covers various topics, concepts, and applications that are useful to daily life activities and professional fields such as business and finance, medicine, engineering, technology, and among others. In these professional fields and economic development, they demand analytical problem-solving skills. Mathematics is even an integral part of economic development. Besides, analytical problem-solving skill is one of the 21st-century skills that need to be addressed in the ever-growing 21st-century society. Because of these, problem-solving, together with critical thinking, became the core and heart of the study of the mathematics subject based on the conceptual framework of the K – 12 Mathematics Curriculum.

However, it is unfortunate to say that analytical problem solving is not appealing and is not of much interest to students in both private and public educational institutions. When it comes to analytical problem-solving in mathematics, students tend to experience fear, worry, anxiety, and loss of courage. In this case, problem-solving in Mathematics may affect students' emotional well-being.

Emotional intelligence, according to Nor, Ismail, and Yusof (2016), is defined as the ability to understand emotions and their interrelationships in order to solve problems based on them. Emotional intelligence has an impact on how a person deals with emotions, mathematics, and self-regulation strategies when learning mathematics. Adolescents who struggle with math are more likely to engage in deviant behavior, which is described as a societal norm characterized as a sort of behavior that violates the law (Shaiful, Kamsol, Mohammad, Ahmad Nizan, Norshimah, & Rozihana, 2009).

On the other hand, problem-solving is the ability to search for solutions to given problems where emotions and feelings are involved and to understand how emotions impact decision making (Book & Stein, 2011). People low in emotional intelligence concerning problem-solving skills typically jump to a solution, avoid dealing with the problem, use an unstructured strategy, and ignores emotional information. Conversely, people high in emotional intelligence concerning problem-solving skills generally gather information first and weigh up the advantages and disadvantages, can identify and solve problems, and use a systematic approach (Rich Learning Solutions, 2018). In other words, emotional intelligence can really influence the problem-solving skills of the students wherein a student with low emotional intelligence lacks the skill and cannot process emotional information properly. In contrast, a student with high emotional intelligence can resolve problems effectively and efficiently.

Moreover, an international assessment on mathematical problem solving revealed that there is a low performance of students' problem-solving skills across various nations. Twenty-one percent of the students failed to reach at least Level 2, which is a drawing board level of proficiency at which students begin to display problem-solving skills that enable them to actively and productively participate in 21st-century cultures (OECD, 2014).

Further, problem-solving skills concerning emotional intelligence showed that among 386 students in a school in Turkey, emotional intelligence and problem-solving skills have a positive relationship (Deniz, 2013). This means that the more emotional intelligence a person has, the more

effective problem solving they can do because it allows them to perceive the situation from a variety of angles. Moreover, the results of the study conducted by Al Abdallat (2016) also revealed that there is a statistically significant relationship between the indicators of emotional intelligence and problem-solving skills among university students. In his study, it implies that having high emotional intelligence leads the way in solving problems effectively.

At the national level, the Philippines scored 378 and ranked 34th of the 38 countries in the Trends in International Mathematics and Science Study (TIMSS) study in 2003 (Dela Cruz, 2017). Furthermore, the study conducted by Silao (2018) in Sarangani showed that 41 out of 95 students or 43.16 percent had not mastered problem-solving skills, and only 8 of 95 students or 8.42 percent have mastered problem-solving skills. This result means that there is low performance in mathematics, and it is evident that year after year, there is a decline in the performance of students in mathematics, specifically in problem-solving.

Similarly, Acopio and Bance (2016) found that the overall emotional intelligence and its dimensions are linked to academic achievement in Filipino university academic achievers. As a result, the data backed up the claim that the better a student's emotional-social intelligence, the more likely they are to exude academic prowess such as problem-solving abilities.

In the Division of Davao City, it was observed that students' performance in mathematics is very low based on the 2011 DepEd Advisory. Based on the ranking of all the Divisions in Region XI, Davao City is considered as low performing (Galabo, Abellanosa, & Gempes, 2018). In addition, low performance in mathematics, analytical problem solving in particular, has also been observed. Based on the recent 2019 first quarter departmental examination on General Mathematics in the school, it showed that more than sixty percent of the students across all strands (ABM, HUMSS, and STEM) failed the said examination. Many students fear problem-solving because it is difficult. They lack the confidence to answer it, and they cannot focus for there is much formula to use. As a result, many students performed poorly on their mathematics quizzes and tests.

Several researchers associated problem-solving skills in mathematics to intellectual intelligence, and rarely to emotional intelligence. Thus, it is in the light of the foregoing information that the researcher has been motivated to conduct correlational research between emotional intelligence and analytical problem-solving skills in mathematics of the students.

II. RATIONALE OF THE STUDY

This study focused on determining the association of the emotional intelligence and analytical problem-solving skills of senior high school students. This research is conducted to gain a better understanding of the level of emotional intelligence and analytical problem-solving skills. This research will help uncover which factors of emotional intelligence affect the analytical problem-solving skills of the students and at which aspect that the teachers can help the students improve their analytical problem-solving skills as well as their emotional intelligence. Through this study and its results, the researcher hopes to contribute to the improvement of the quality of mathematics education in schools, both locally and nationally. Notably, the study's results and findings will be beneficial to the following:

- *Department of Education.* This study hopes to help education officials to encourage the involved school personnel and other stakeholders to look into the dimensions of emotional intelligence that may have an effect to the analytical problem-solving skills of students in mathematics. Through this, appropriate intervention or program may be implemented.
- *Mathematics Teachers.* The conduct of this study will be very beneficial to teachers, especially mathematics teachers. Through this study, they will be given the opportunity to evaluate students' emotional intelligence and then provide students with learning activities that will boost their emotional intelligence. In addition, the results of this study may help teachers craft teaching strategies and techniques and learning activities that will help students enhance their analytical problem-solving skills and not compromising their emotional intelligence.
- *Students.* The direct recipient of the results of this study is the students. The result of this study will provide information on their level of emotional intelligence and analytical problem-solving skills in mathematics. This will guide them on how to enhance, control, and manage their emotional intelligence that may lead them in a deep understanding of their inner self, and it may help them to become better problem solvers in mathematics and even in real-life circumstances. Furthermore, this study will help the students use and even create techniques in analytical problem solving that suit their learning abilities and capabilities that will eventually improve their problem-solving skills.
- *Parents.* This study will inform them of their child's level of emotional intelligence in which they can be guided in supporting the needs of their child and helping them enhance their emotional intelligence to become more equipped when solving problems in Mathematics. Further, the results of this study will give parents ideas and explanations on the high or low performances of their child in Mathematics, specifically in problem-solving.
- *Future Researchers.* This study will add to the body of knowledge about emotional intelligence and problem-solving skills in mathematics. Current and future researchers may further explore this topic in another context for a deeper understanding of the relationship

between emotional intelligence and problem-solving skills. This may also be done qualitatively.

III. STATEMENT OF THE PROBLEM

The primary purpose of this study is to determine the relationship between emotional intelligence and analytical problem-solving skills in General Mathematics of the senior high school students of the academic year 2019 – 2020.

Specifically, this study answers the following questions:

- What is the level of emotional intelligence of students in General Mathematics in terms of:
 - self-awareness;
 - self-management;
 - self-motivation;
 - empathy; and
 - social awareness?
- What is the level of analytical problem-solving skills of students in General Mathematics in terms of:
 - identification and understanding of the problem;
 - analysis of information; and
 - execution of the solution?
- Is there a significant relationship between the level of emotional intelligence and the level of analytical problem-solving skills of students in General Mathematics?
- Which of the emotional intelligence dimensions has an influence on the analytical problem-solving skills of students in General Mathematics?

IV. LITERATURE REVIEW

This section presents relevant research articles and reviews on emotional intelligence and analytical problem-solving skills. Firstly, emotional intelligence is discussed including its five dimensions: self-awareness, self-management, self-motivation, and social awareness. Secondly, analytical problem-solving skills in mathematics was discussed with the indicators identification and understanding of the problem, analysis of information, and execution of the solution.

A. Emotional Intelligence of Students

Salovey and Mayer as cited by Brackett, Rivers, and Salovey (2011) formally described the term emotional intelligence wherein they defined it as the ability to keep an eye one's own and others' feelings and emotions, to distinguish these feelings and to use this information to help guide one's thinking and actions. It means that emotional intelligence is a combination of cognitive and affective processes wherein emotions can be factors in developing mental processes that help in learning, and having emotional intelligence may mean that there is a probability for goals to be achieved. Moreover, Goleman as cited by Brackett, Rivers, and Salovey (2011) declared that emotional intelligence was both an answer to the violence afflicting various schools and predicting success in life because it is as powerful and, at times, more powerful than intelligence quotient.

Additionally, according to Rupande (2015), emotional intelligence is very crucial to student learning. Emotional intelligence allows a person to communicate, lead, and negotiate with others. An individual with emotional intelligence is able to understand his or her own emotions and that of the others. Emotional intelligence actually allows a person to learn more in school since the individual is able to integrate well both socially and academically. A person with emotional intelligence plays well in a team and learns a lot from positive interaction with lecturers and other students. Moreover, emotional intelligence combines the critical aspects of interpersonal and intrapersonal relationships, adaptability, moods, and stress management skills, which have an effect on students' academic performance (Ebinagbome & Nizam, 2016).

In the study of Noriah et al. (2016), they reported and demonstrated that emotional intelligence has a positive relationship with one's cognitive ability and competency in completing a task. Furthermore, the results of the study by Vicki, Pamela, Sian, Yvon, and Lynne as cited by Festus and Seraphina (2015), showed that there is a significant positive correlation between emotional intelligence and academic achievement in Mathematics of the students. The findings of the study showed that females had a more positive relationship than males suggesting that females possessing a higher level of emotional intelligence demonstrated greater mathematical proficiency.

Likewise, in the study of Al Abdallat (2016), it showed that there is a statistically significant relationship at 0.01 level of significance between the dimensions of emotional intelligence and problem-solving skills among university students. This result could be interpreted that people with high emotional intelligence are characterized by self-confidence and the ability to self-directing and appreciation and cooperation with others, and optimism, empathy, responsibility, openness, and motivation to complete the work, they are also characterized by the ability to solve problems and independence, and to adapt to the pressures of life, and the ability to analyze the feelings and emotions of others, and use of the information available to solve problems and conflicts.

Moreover, Bai (2011) examined anxiety proneness and emotional intelligence in relation to the academic achievement of pre-university students. The study is exploratory; the performance of the students in the examination was considered very seriously to study the influence of anxiety proneness and emotional intelligence on their academic achievement. He involved 500 students belonging to Bangalore urban and rural areas from various education streams like science, arts, and commerce. His analysis reported that there was a significant difference in academic achievement and emotional intelligence.

Furthermore, Yahaya, Bachok, and Yahaya (2011) studied the relationship between the five dimensions of emotional intelligence, i.e., self-awareness, emotional management, self-motivation, empathy, interpersonal skills, and academic performance. It revealed that there is a significant relationship between self-awareness, emotional

management, and empathy with academic performance. In like manner, the study conducted by Chamundeswari (2013) among 321 higher secondary school students from three different types of schools, namely: central board schools, state board school, and matriculation board school, highlighted that there a significant positive relationship between emotional intelligence and academic achievement among the students. The students belonging to the central board schools have a higher level of emotional intelligence compared to students in the state board but did not differ with students in matriculation board schools at the higher secondary level. Similarly, students belonging to central board schools are found to perform better in academics compared to students in state and matriculation board schools at the higher secondary level.

Furthermore, the results of an experimental study on emotional intelligence and mathematics score by Shafiee, Madji, Khoshkhou, and Rajabi (2016) showed that the values obtained in the experimental group is 8.469 and in the control group is 46.98 and 71.836. This concluded that there is a significant positive relationship between all the components of emotional intelligence, including emotional self-awareness, decisiveness, self-esteem, self-actualization, interpersonal relations, social responsibility, problem-solving, reality testing, stress tolerance, impulse control, happiness and optimism, and student math scores.

In other words, as one has more components of emotional intelligence listed, the math scores placed at a higher level. The learner in good teaching that helps learners learn well must be active, discuss, solve problems, and gain experience with the guidance of their teacher. Most mathematicians have high social intelligence, and their hard works how their high confidence. They understand the philosophy and abstract concepts, and this cause a superior spiritual knowledge. Innovation and initiative in problem-solving are because of creative intelligence, and authentic learning is the characteristics of cognitive intelligence. They will know the position and ability to meet their reasonable demands. Hence, it should be taken to promote a variety of intelligence, not just cognitive intelligence, and that prevention is better than treatment problems such as lack of learning, and academic failure.

This is also supported by the results in the study of Festus and Seraphina (2015) which revealed that emotional intelligence of students in secondary schools would improve upon by exposing them to the emotional intelligence skills; Acquisition of emotional intelligence skills by students leads to improvement in academic achievement of students in Geometry; acquisition of emotional intelligence skills by students improves the academic achievement of both male and female students in Geometry; gender is not a factor in designing the emotional intelligence treatment interventions for students. They added that students who are generally attuned to their emotions, as well as the emotions of others, can adapt to emotionally driven situations and are more likely to attain higher levels of academic achievement. Findings from this research suggest that students with higher emotional

intelligence scores better-manage the demands and pressures of academic life. When students learn specific skills such as self- control, the skills help them to prioritize the time needed for study as opposed to other activities.

Bance and Acpio (2016) pointed out that there have significant positive associations with intrapersonal, interpersonal, stress management, adaptability, and general mood to the overall emotional intelligence, while overall emotional intelligence and its composite dimensions are correlated to academic performance. Hence, the findings confirmed the claim that the more the student achievers become emotional-social intelligent, the higher their tendency to exude academic prowess such as problem-solving skills. This study further highlights the possible implications of emotional intelligence in educational progress and academic success; hence emotional intelligence-based activities should be integrated into the higher education curriculum.

Self-awareness. Self-awareness is one of the dimensions of emotional intelligence which occurs when the individual knows what he is feeling in the moment, and using those preferences to guide decision-making, having a realistic assessment of his own abilities and a well-grounded sense of self-confidence (Ugoani, Emenike, & Amu, 2015). It means that it is the ability to be aware of and understand our emotions, and it is the ability to recognize our feelings.

Moreover, Ott (2017) stretched out that it can simply be put that self-awareness is a basic understanding of how individuals feel and why they feel that way. It means that the more we are aware of our feelings, the easier they are to control and dictate how we might respond to others. Furthermore, Keidar (2015) pointed out self-awareness is an individual's ability to understand the emotional dynamics, the thoughts, and attitudes underlying daily interaction on both the intrapersonal and interpersonal planes.

Also, according to Cherry (2019), for a person to be aware of his or herself, he or she must be capable of monitoring his or her feelings, recognizing various emotional reactions, and then accurately identify each particular emotion. Individuals who are self-aware can grasp the relationship between the things they feel and how they behave. These individuals have the capability of sensing their own strengths and weaknesses, learn from their interactions with others, and more open to new information and experiences.

In the study of Al Abdallat (2016), it showed a significant relationship between self-awareness and problem-solving skills at 0.01 level of significance. It means that when a student can recognize and understand what he/she feels at the moment and can recognize his/her strengths and weaknesses, a student can independently solve problems and adapt to the pressures of life. It is also supported by Ylvisaker (2019) who emphasized that when students are not aware of the difficulties and challenges in a given problem or resisting to acknowledge such difficulties

and challenges, they monitor their performance in that area less effectively and engage in successful problem solving when problems emerge. When students resist problem-solving strategies and methods or fail to develop habits of problem-solving, it is often because of either weak awareness of or resistance to acknowledging their difficulties.

Moreover, Hess and Bacigalupo (2014) argued that problem solvers who are self-aware and can honestly and accurately assess their strengths in comparison to others in the organization have the advantage of leveraging the attributes of others in the problem-solving process. The ability to assess the reactions of solutions and potential emotional outcomes can empower problem solvers to predict the feelings of those affected by solutions, thereby increasing the probability of a more positive solution outcome.

Self-management. Self-management, self-regulation, or mood management, by definition, is the ability to manage or control one's feelings, thoughts, and actions in flexible ways to get the desired results (Ott, 2017). Moreover, Ugoani, Emenike, and Amu (2015) pointed out that this dimension of emotional intelligence involves guiding our emotions so that it does not interfere with the task at hand they but rather facilitate it; having conscientious and delaying gratification, pursuing goals; recovering well from emotional distress.

Also, Keidar (2015) stretched out that mood management includes the ability to calm down in situations involving stress, anger and anxiety; the ability to convert negative and destructive thoughts into more positive ones; recognizing the ability to differentiate between thoughts, emotions, behavior and personal prejudices; the ability to identify mood shifts and regulate moods in accordance with our intentions through our thought processes; and the ability to free oneself from old patterns of behavior and habits that are not beneficial. Further, Hess and Bacigalupo (2014) pointed out that when the need for a new problem-solving process arises, those who can manage themselves and the correct course will earn the trust of those involved in the process. Emotionally intelligent problem solvers are characterized by their ability to suppress their desires and interests for the common good.

The study of Al Abdallat (2016) showed that self-management is significantly correlated with problem-solving skills at 0.01 level of significance. It means that students with self-management help to combine logic and emotions in solving problems and increase the ability to sound positive thinking, planning, and follow-up implementation to achieve goals no matter how difficult the problem is. In addition, it is implied that when a student can regulate his/her own emotions and can calm down when solving a problem, he/she can obtain the desired results in the process of problem-solving.

Self-motivation. This dimension of emotional intelligence involves using available most deep-seated preferences to move and guide the individual toward

desired goals to help in taking the initiative and striving to persevere and to improve in the face of setbacks and frustration (Ugoani, Emenike, & Amu, 2015). Besides, self-motivation refers to gathering up your feelings and directing yourself towards a goal despite self-doubt, inertia, and impulsiveness (Chamundeswari, 2013). On the other hand, Cherry (2019) argued that those who have high self-motivation tend to be more action-oriented than the others. They always look for ways to do better, set goals, and have a high need for achievement. They are good at taking the initiative when a task is put forth before them, and they tend to be very committed.

It is also emphasized by Center on Education Policy (2012) that motivation can affect how students' bond to teachers, how much support they seek when struggling, how much time and effort they devote to their studies, how they perform on tests, and many other aspects of education, and approach school in general. It is difficult, if not impossible, to enhance their academic achievement, no matter how good the teacher, curriculum, or school is if students are not motivated. Moreover, unmotivated students can disengage other students from academics, which can affect the environment of an entire classroom or school. Students with higher motivation to learn have been linked not only to better academic performance, but to greater conceptual understanding, satisfaction with school, self-esteem, social adjustment, and school completion rates.

Subsequently, the results in the study of Al Abdallat (2016) revealed that self-motivation as a dimension of emotional intelligence has the strongest correlation with problem-solving skills ($r = 0.509$ at 0.01 level of significance). It showed that students with a high level of self-motivation would likely achieve more and complete tasks, which is characterized by the ability to solve problems. On the other hand, a student with low self-motivation will have difficulty in completing a task leading to poor problem-solving skills. Furthermore, the study conducted by Gasco and Villarreal (2013) affirmed that secondary school students who solve arithmetic-algebraic word problems through the algebraic method stand out for their high degree of motivation in mathematics as an academic subject, specifically in their task-valuation and in their expectations of self-efficacy.

In the study of Gbollie and Keamu (2017), it indicates that students' problem-solving performance significantly relates to the self-motivation among junior and senior high school students in Liberia. In addition, Liberian students with a high level of motivation are more capable of using various learning strategies. However, it is contingent on the sort of beliefs they hold. Learners with a higher amount of views, such as extrinsic and task value, are more likely to use strategies, including rehearsal and organization.

Empathy. This dimension of emotional intelligence is related to having the ability to understand other people, and its considerable use in education would be supportive of teaching practices. Critical characteristics of empathy that are trained as a result of these exercises include recognition, listening, imagining, and experiencing others'

emotions. There is arguably an association between increased empathy and its link to increased levels of emotional intelligence (Gill & Sankulkar, 2017). Moreover, empathy also involves responses to people based on existing information. When a person senses someone's feelings like sadness or hopelessness, it will likely influence how that person responds to the other person. A person might make an effort to buoy their spirits or treat them with extra care and concern (Cherry, 2019).

In the study of Faisal and Ghani (2015), it was revealed that empathy domains have a strong correlation with leadership skills are political awareness, followed by leveraging diversity, developing other's potential, caring, and helping others. In addition, Ebinagbome and Nizam (2016) concluded in their study that empathy and self-motivation have a stronger influence on the academic performance of Malaysian tertiary institutions.

Additionally, according to Hess and Bacigalupo (2014), empathy enables problem solvers to judge the impact of not only their solutions but also the manner in which those solutions are reached. The best solutions are those that can be understood and accepted by the individuals most affected by the solution. Whether they are individuals or groups, problem solvers who practice the value of empathy can foresee the impact of their solutions before implementation. In recalling a problem and solutions that affected others negatively, reflect on the negative consequences experienced and how the solution made others feel.

In the same way, the study of Al Abdallat (2016) revealed that empathy has a positive correlation with problem-solving skills among university students ($r = 0.341$ at 0.01 level of significance). It showed that it helps in the intellectual processing that facilitates the steps of the solution in the problem and that of by understanding the subjective feelings and understanding other people's feelings and expressing them, set goals and alternative ways to solve the problem, especially when developing the plan to resolve and do a review.

Social Awareness. According to Ott (2017), social awareness is the ability to read situations appropriately and notice the emotions of others accurately. It is about sensing what others are feeling and thinking to be able to take their perspective using your capacity for empathy. Social awareness is all about discerning that someone in the room is frustrated by the given task and giving a response in a way that negative emotions will be prevented. Our brains take note of how the other person responded, and connected tissues keep us in an interpersonal loop of emotional connection. To do this, becoming aware of the emotions of others around us, and the circumstances that impacted them is a must.

Furthermore, social awareness is the ability to see someone's emotions and understand what is going on in the conversation. It is the skill to see all the feelings present at the moment of the conversation. It is the ability to correctly accessing emotions as things unfold. It is one thing to

analyze a conversation from afar than it is right in the middle of the conversation. Social awareness helps a person to stay vigilant in the surroundings (Hudson, 2019). Also, Al Abdallat (2016) showed that the correlation between social awareness and problem-solving skills exists among university students. It means that students with excellent and effective means of dealing with others based on the understanding and knowledge of their feelings will likely be effective and efficient in problem-solving processes.

Moreover, Hess and Bacigalupo (2014) emphasized that in both individual and group problem-solving processes, the ability to manage relationships is pivotal to success. Even the best of solutions can have negative results if not properly communicated, including the proper articulation of problem-solving processes.

The study conducted by Aydogan, Metin, Buyukozturk, Mercan, and Kavak (2017) among primary school students revealed that there was a positive and meaningful relationship between the students' social awareness proficiency and problem-solving skill perceptions, that the age of the students caused a significant difference in the social awareness levels of the students, and that the pre-primary education students, the female students, the fourth-grade students and the students with high academic averages had higher level of social awareness and more adequate problem-solving perception.

B. Analytical Problem-Solving Skills of Students

Problem-solving is a fundamental means of developing mathematical knowledge at any level. For this reason, it is one of the most important, if not the most crucial aspect of doing mathematics. Problem-solving competence is an individual's capacity to resolve problem situations where a method of solution is not immediately apparent and engage in cognitive processing to understand. Analytical problem-solving, in particular, refers to the ability to identify and define problems, extract vital information from the problem and develop applicable solutions to a given problem in order to test and authenticate its cause and develop solutions to resolve the problems identified (Chicago State University, 2019).

Moreover, analytical problem-solving skill is the ability to scrutinize and breakdown facts and thoughts into their strengths and weaknesses and to develop the capacity to think in a thoughtful, discerning way, to analyze data, to solve problems, recall, and use information (Amer, 2005). It also involves a systematic step-by-step approach to thinking that allows you to break down complex problems into single and manageable components. It means that analytical problem-solving skill is a powerful skill that will help a student differentiate information and data useful in a specific problem or situation and a person can execute the appropriate solution to that problem or situation.

Developing a deep understanding of concepts and skills driven by teaching through problem-solving is essential in a Mathematics curriculum. New concepts and skills that have important mathematical ideas embedded should be introduced in the context of solving problems. Then examples should be used that extend understanding

and promote thinking and reasoning. Presenting examples as problems and modeling effective thinking and reasoning habits promotes understanding and mastery (Charles, 2009).

Furthermore, problem-solving, such as analytical problem solving, begins with recognizing the existence of a problem and demonstrate an understanding of the purpose of the problem. It requires the solver to identify parts of the problem that need to be solved, plan and execute the solution, and monitor and evaluate progress throughout the activity. In addition, the context of a problem of whether it is familiar or unfamiliar, or understood or not, the external resources available to the solver, and the environment in which the solver operates will affect the way the solver approaches and engages with the problem. Motivation and affective factors will not be measured in the problem-solving assessment, but some may be addressed generally, or with particular reference to mathematics, in the student questionnaire (OECD, 2014).

According to Chicago State University (2019), there are three levels of proficiency in analytical problem solving, namely: levels 1, 2, and 3. In Level 1, students undertake a process of information and data collection and analysis for integration purposes, identify and make sets of information and determine their relationships, and make logical deductions from data. In Level 2, students collect all the relevant information and data needed to address the problem, organize, classify and synthesize the data into fundamental issues, identify the most probable causes of the problem, reduce the information down into manageable components, and identify the options and solutions for addressing the problems analyzed.

Furthermore, based on the findings in the study of Said, Tasir, and Ismael (2017), high achieving students exhibit basic content-based systematic reasoning during their thinking process, thus making them a good problem-solvers for routine problems but at an average for non-routine problems. One obvious obstacle that caused this result was their attitude. They prefer to solve the least challenge question and have a positive perception that memorizing facts will help them to solve most of the items.

They emphasized that based on PISAs' OECD grading system, 75 percent of the students fall into Level 3 problem solving which indicated that they are capable of implementing the skills with the non-routine problem but could not provide fundamental justification for each process. It suggests that learning guidance and encouragement from teachers and peers are needed and may play an essential role in improving their problem-solving skills. Half of Levels 3 students were those with a moderate level of problem-solving skills. These students rely solely on memorizing facts and drill practice strategy that commonly involves a routine problem. It is expected that they may encounter difficulties once a non-routine problem is given. Since none of them were in the elementary level of problem-solving (Level 1), it shows high achievers minimally fall at Level 2 of problem-solving

classification, which proved that basic systematic reasoning is still present during their thinking process.

Identification and Understanding of the Problem. This cognitive process of the analytical problem-solving skill the student should be able to describe the situation without prejudice, focus on relevant details, explain the perspectives of all those involved in the situation, and describe the situation so that other people can understand it (Jonsson & Lennung, 2011). In addition, in the identification of the problem or issue, students construct a clear statement of the issue or problem (University of Wisconsin, 2016). It is also evident in this process that students can identify evidence needed to examine an issue or problem, students represent the issue/problem in appropriate forms (e.g., charts, graphs, tables, figures, narratives, etc.), students can convert data or information from one form to another, and students appropriately address the complexity of the issue or problem.

Moreover, the indicator identification and understanding of the problem is closely related to the indicator exploring and understanding of problem-solving skills by PISA in which its objective is to build mental representations to every piece of information presented in the problem. It involves exploring and observing the problem situation, interacting with it, searching for information, understanding given information, finding limitations or obstacles, and information discovered while interacting with the problem situation, demonstrating an understanding of relevant concepts (OECD, 2014).

In the study conducted by Peranginangin and Surya (2017) among Grade 7 students in Indonesia, it showed that the percentage of students' problem-solving ability in identifying and understanding the problem was 75.08 percent. It means that the students were able to describe the situation and constructed a clear statement of the problem. The students can also write and identify the given and knowns of the problem. In contrast, based on the result of the study conducted by Arum, Kusmayadi, and Pramudya (2017) among the Grade 9 students, it showed that based on the problem-solving and interview, it seems that students have difficulty to understand the problem. It is indicated by students' inability and fails to identify the unknown of the problem correctly. In this case, students do not know that the question relates to sample space.

Based on the PISA 2012 results, students from best-performing countries and economies such as Chinese territories, Korea, and Singapore perform strongest on problems involving exploring and understanding (OECD, 2014). It means that the students have the ability to identify and represent the information in the problem. In contrast, lower-performing countries and economies in problem-solving such as Latin American countries Brazil, Colombia, Chile, and Uruguay) need to concentrate mainly on improving students' performance on identifying and understanding the problem.

Analysis of Information. This cognitive process of analytic problem-solving skills the student should be able to identify those involved in the situation, interpret the situation, and discuss conceivable consequences of the situation (Jonsson & Lennung, 2011). Also included are strategies for solving the problem at a global level and identification of relevant methods and procedures. Graphs, tables, formulae, symbolic representations, and other artifacts may be recruited (Graesser, Kuo, & Liao, 2017). Moreover, this phase is also about fact-finding and analysis, building a more comprehensive picture of both the goals and the barriers. This stage is essential for problems of a more complex nature and may not be necessary for very simple problems but the indicator analysis of information is closely related to representing and formulating in the PISA framework. The objective here is to build a mental representation of the problem situation that is coherent. To do this, relevant information from the problem must be selected, mentally organized, and integrated with relevant prior knowledge (OECD, 2014).

It is evident in the study conducted by Arum, Kusmayadi, and Pramudya (2017) that the students have the difficulty of choosing and using strategy refers to students' difficulty in identifying an appropriate strategy and using it for solving the problem. It can be determined by students' errors in arising and carrying out the formula or algorithm for solving the problem. Students are not able to choose and use the formula, and the algorithm relates to the question of the problem. It is possibly caused by students misunderstanding about probability concept and the inability to remember strategies for solving the problem.

Opposite to the results above the study conducted by Peranginangin and Surya (2017), among Grade 7 students in Indonesia, revealed that 66.2 percent of students have good enough analysis of information. It implies that students are able to choose and use the formula, and the algorithm relates to the question of the problem, and the students were able to grasp why the problem occurred.

Based on the PISA 2012 results, in Macao-China, Chinese Taipei, Shanghai-China, Korea, Singapore, Hong Kong-China, Canada, Italy, Japan, France, Australia, and Belgium, it showed that the students are good at generating and experimenting with alternatives, and good at abstract information processing. In contrast, lower-performing countries and economies in problem-solving such as Latin American countries (Brazil, Colombia, Chile, and Uruguay), need to concentrate mainly on improving students' performance on building a more comprehensive picture of the situation or problem (OECD, 2014).

Execution of the Solution. This cognitive process of analytical problem-solving skills includes a thorough analysis of the various possible courses of action and then selecting the most appropriate solution for implementation (Skills You Need, 2019). In addition, it includes the goal of the problem, setting sub-goals, developing a plan to reach the goal state, and executing the plan. The plans may involve physical actions, social interaction, and

communication (Graesser, Kuo, & Liao, 2017). Furthermore, this includes goal setting, including clarifying the overall goal, and setting sub-goals, where necessary; and devising a plan or strategy to reach the goal state, including the steps to be undertaken; and executing, which consists of carrying out a plan (OECD, 2014).

The results of the study conducted by Arum, Kusmayadi, and Pramudya (2017) pointed out that based on the problem-solving result and interview of the students, it seems that they still make errors in an arithmetic operation, even the student can determine the formula of probability. It is possibly caused by students' carelessness and inaccuracy while the computational process. Also, students may not evaluate their problem-solving process, which leads them to errors. It means that subjects still have difficulties regarding the computational process in solving the probabilistic problem.

Furthermore, in the study conducted by Peranginangin and Surya (2017) among Grade 7 students in Indonesia, it showed that only 29.03 percent of the students gave appropriate solutions to the problem. It means that a lot of students have difficulty in solution making and computational processes in analytical problem-solving. At this stage, good problem solvers able to implement their plans and demonstrate the ability to think metacognitive during the implementation of the plan, as well as being able to check back in the plan at the time of or after carrying out the plan that was implemented.

There have been several valuable studies and literature on the relationship between emotional intelligence and academic performance in mathematics or mathematical scores of the students. Previous studies have generally found a positive correlation between emotional intelligence and academic performance in mathematics among students. However, none of these research articles provide a clear picture of what particular aspect of mathematical skill has been studied, and it was seen that this type of study is rarely applied to senior high school students, and the reason could be the senior high school was just implemented a few years ago. Thus, to fill in the gap, this research paper investigates the relationship of emotional intelligence and a more specific mathematical skill, which is the analytical problem-solving skills of senior high school students.

V. METHODS

A. Research Design

This study employed a quantitative descriptive-correlational design. Correlational research is a research method for examining and testing objective theories by looking at the relationship between two variables. In turn, these variables can be measured, typically on instruments, so that numbered data can be analyzed using statistical procedures (Creswell, 2014). In particular, Simon and Goes (2011) pointed out that a descriptive and correlational study examines two variables in their natural environments, and it does not include researcher-imposed treatments. The primary purpose of descriptive-correlational research is to determine relationships that exist between two variables

and to determine a regression equation that could be used to make predictions to a population. In bivariate correlational studies, the relationship between the two variables is measured.

B. Research Respondents

The research respondents of this study were the selected regular Grade 11 students of the Senior High School Department of the identified school. The students were coming from three academic strands: Accountancy, Business, and Management (ABM); Humanities and Social Sciences (HUMSS); and Science, Technology, Engineering, and Mathematics (STEM). The researcher utilized the Slovin's formula with a five percent margin of error to identify the sample size from the population size of Grade 11 students.

To get the sample population for this study, the researcher used a stratified random sampling. Stratified random sampling is a sampling method that involves the division of a population into smaller sub-groups known as strata. In stratified random sampling or stratification, the strata are formed based on members' shared attributes or characteristics. In this study, the stratification was according to the students' section and strand. For this study, stratified random sampling was ideal because the researcher only needs samples across all the sections and strands in Grade 11. Then, the researcher randomly selected students from each section to complete the required number of respondents in each section. The population size is 507, and it follows that the sample size is 219. The distribution of the respondents are as follows: 36 from ABM, 1246 from HUMMS, and 59 from STEM.

C. Research Instrument

To answer the research questions presented in this study, the researcher administered a survey questionnaire about emotional intelligence and a test questionnaire on problem-solving skills about General Mathematics. The survey questionnaire about emotional intelligence that was used in this study was adapted from the London Leadership Academy (2019). This was modified to fit the context of the study. The questionnaire was composed of five dimensions: self-awareness, self-management, self-motivation, empathy, and social awareness. Each dimension contains ten statements that support the indicated type of emotional intelligence. The total number of item/statements for this is 50. The statements were measured using a 5-point Likert scale with 1 as does not apply, 2 as applies a few times, 3 as applies half the time, 4 as applies often, and 5 as applies always. Moreover, the research questionnaire on emotional intelligence was validated by three assigned expert validators. The result of the validation has an overall mean score of 4.17, which means that the questionnaire is valid.

On the other hand, to obtain the level of analytical problem-solving skills of the students, the researcher constructed a test questionnaire with items about General Mathematics based on a Table of Specifications (TOS) and K – 12 Curriculum Guide. The questionnaire consisted of 36 items and there were 12 questions in each indicator of

analytical problem-solving skills. The scores were then converted to percentages. Three validators validated the test questionnaire, and it obtained a validation mean score of 4.17, which means it is valid. Further, it has been pilot tested to ensure reliability and it obtained a Cronbach alpha value of 0.796, which means that the test questionnaire is reliable.

VI. RESULTS AND DISCUSSION

A. Level of Emotional Intelligence

Table 1 shows the result of the level of emotional intelligence of the Grade 11 senior high school students in terms of its five dimensions, namely: self-awareness, self-management, self-motivation, empathy, and social awareness. It presents the mean, standard deviation, and qualitative description of each dimension. Further, the overall level of emotional intelligence is also shown.

Emotional Intelligence Dimensions	Statistics		
	Mean	Standard Deviation	Qualitative Description
Self-awareness	3.10	0.52	Moderate
Self-management	3.13	0.50	Moderate
Self-motivation	2.97	0.58	Moderate
Empathy	3.09	0.60	Moderate
Social awareness	2.94	0.54	Moderate
Overall mean	3.05	0.31	Moderate

Table 1: Level of Emotional Intelligence of Students

As reflected in Table 1, the overall mean of the emotional intelligence of the Grade 11 senior high school students is 3.05, which means that it is at a moderate level. Notably, the self – management dimension got the highest mean among the dimensions at 3.11, which means a moderate level. Next is self – awareness dimension with a mean of 3.10, followed by empathy, which has a mean of 3.09 and then, self – motivation with a mean of 2.97, which means that these dimensions are at a moderate level. In addition, the dimension of emotional intelligence, which got the lowest mean, is social awareness with a mean of 2.94, and still, it is at a moderate level.

It can be gleaned from the table that the self – management dimension of emotional intelligence has the highest mean at a moderate level. It indicates that senior high school students have an average capability of managing or governing their own emotions. With this, it can be said that the Grade 11 senior high school students have the ability to suppress their emotions when needed, openly show their feelings and emotions to others, rarely lose temper unexpectedly, handle difficult people appropriately, and they can alter their negative emotions from bad situations to a positive one.

On the other hand, the social awareness dimension of emotional intelligence has the lowest mean though it is still at a moderate level. It means that the Grade 11 senior high school students possess the ability to be good listeners, good at adapting and mixing with a variety of people, good

at reconciling differences with other people, and good at building a harmonious relationship with those they work with. In addition, they also love to meet new people to discover more about them because they believe that it will make their work enjoyable.

Moreover, the self – awareness, self – motivation, and empathy dimensions of emotional intelligence are all still at a moderate level. It can be inferred that in self – awareness, the students have an average consciousness of their own emotions such as they know when they are happy, sad, stressed, or anxious, or annoyed, and slowly realize that they are about to lose their temper. In self – motivation, the students can moderately motivate themselves in doing difficult tasks and prioritize essential things and motivate themselves even when they feel low. The students also believe that motivation is their key to success because every day, they encounter problems that need to be solved, things to be accomplished, and goals to be achieved. In empathy, the students are good at empathizing with someone else's problem, they can see and understand things from other person's viewpoints, and they can also tell the feelings or emotions of other people towards them.

Further, the overall level of emotional intelligence of the Grade 11 senior high school students is at a moderate level. It indicates that the students are sometimes aware of their own emotions, and they can moderately understand their own and others' emotions or feelings. The students are also good at intrapersonal aspects, for they can control and manage their own emotions as well as interpersonal aspects since they can build social relationships making them team players. With these descriptions, students with this level of emotional intelligence can be excellent problem solvers and goal achievers.

The results of this study on the level of emotional intelligence are similar to the results of the study of Nor, Ismail, and Yusof (2016) wherein the emotional intelligence of the secondary school students is at a moderate level. The reasons for having an average level of emotional intelligence can be accounted for that the senior high school students at this stage had reached a moderate degree of monitoring their own and others' emotions and controlling these emotions to create a more appropriate reaction and response to certain situations. They also have an average capacity to empathize with others and build effective social relationships.

Festus and Seraphina (2015) also revealed that students who are generally attuned to their emotions, as well as the emotions of others, can adjust to emotionally driven situations. They pointed out that when students develop certain abilities such as self-control, they are better able to prioritize the time they need to study. Furthermore, People with high emotional intelligence, according to Al Abdallat (2016), have self-confidence and the ability to self-direct, as well as appreciation and cooperation with others, optimism, empathy, responsibility, openness, and motivation to complete work, adapt to life's pressures, and the ability to analyze others' feelings and emotions.

B. Level of Analytical Problem-Solving Skills in General Mathematics

Table 2 shows the result of the level of analytical problem-solving skills of Grade 11 senior high school students in General Mathematics subject in terms of identification and understanding of the problem, analysis of information, and execution of the solution. It also presents the minimum and maximum score, standard deviation, mean, and descriptive level of each indicator.

Analytical Problem-Solving Skills Indicators	Statistics			
	Mean Score	Standard Deviation	Percentage	Qualitative Description
Identification and Understanding of Problem	5.93	2.13	49.58%	Satisfactory
Analysis of Information	3.94	1.76	32.83%	Poor
Execution of Solutions	3.94	1.62	32.83%	Poor
Overall mean	13.81	3.91	38.36%	Poor

Table 2: Level of Analytical problem-solving skills in general mathematics

As shown in Table 2, the overall mean of Grade 11 senior high school students' analytical problem-solving skills in General Mathematics is 13.81 (38.36%), which means that it is at a poor level. Specifically, identification and understanding of the problem aspect got the highest mean score, which is 5.93 that corresponds to a satisfactory level. Additionally, the analysis of information and execution of solution aspects of analytical problem-solving skills has the lowest mean score, which is 3.94 (32.83%), which corresponds to a poor level.

Subsequently, the identification and understanding of problem at a satisfactory level means that the students manifest satisfactory skills in building mental representations of each of the pieces of information presented in the problem, understanding given information and information discovered, identifying parts of evidence needed to examine an issue or problem, students represent the issue/problem in appropriate forms and constructing a clear statement of the problem.

Moreover, the students have a sufficiently good ability to write and identify the givens and unknowns of the problem. However, at this level, the students still possess difficulty in searching for essential and useful information needed in the problem, finding limitations and obstacles in the problem, converting data or information from one form to another, and appropriately address the complexity of the issue or problem.

Further, the result conforms to the PISA 2012 results wherein the OECD students have a satisfactory level of identifying and understanding the problem at 47.9 percent. At this level, the students are good at building mental representations of each of the pieces of information

presented in the problem (OECD, 2014). Likewise, the result of this study of students having a satisfactory and still possessing difficulties in the identification and understanding of problem aspect of analytical problem-solving skills conforms to the study of Peranginangin and Surya (2017) that 24.92 percent of Grade 7 students have the low ability in identifying and understanding the problem. Likewise, the findings of the study of Arum, Kusmayadi, and Pramudya (2017) on grade 9 pupils revealed that students have trouble grasping the problem, as evidenced by their incapacity and failure to accurately identify the unknown of the problem.

Whereas, the level of analytical problem-solving skills of the Grade 11 senior high school students in General Mathematics in terms of analysis of information is poor at 32.83 percent. It suggests that the students have the poor ability to finding and applying approaches, strategies, and procedures needed in solving problems. It also indicates that the students have the low ability to build a more comprehensive picture of both the goals and the barriers in the problem, organizing critically the provided and inferred information from the problem, and formulating equations and notations useful in the problem.

Further, the findings are consistent with the PISA 2012 results, which show that students in lower-performing countries and economies, such as Latin American countries and Middle Eastern countries, have a low ability to formulate equations and notations that are useful in solving problems. They need to focus primarily on improving students' performance on building a more comprehensive picture of the situation or problem (OECD, 2014).

In addition, these findings conform to the study of Arum, Kusmayadi, and Pramudya (2017) that students have difficulties identifying and implementing strategies, as evidenced by their faults in formulating and carrying out the problem-solving formula or algorithm. Furthermore, students are unable to select and apply the formula, and the method is related to the problem's question, which can be ascribed to their misunderstandings in assessing the problem.

Meanwhile, the level of analytical problem-solving skills of the Grade 11 senior high school students in General Mathematics in terms of execution of solution is also poor at a score percentage of 32.83 percent. It reveals that the students have a low ability to carefully evaluating different courses of action to be taken in solving problems and carefully selecting the best solutions to problems. In addition, the students often commit errors in performing arithmetic operations as well as steps needed in the completion of a solution to a problem.

Further, the results also conform to the PISA 2012 results that several countries such as southern and eastern Europe have a relatively weak performance on this aspect of problem-solving. Students in these countries appear to have a particularly difficult time understanding, elaborating on, and integrating information that is not expressly delivered to them (verbally or visually) (OECD, 2014).

Also, the findings are similar to the results of the study of Peranginangin and Surya (2017) that 70.97 percent of the students have difficulty in solution making and computational processes in analytical problem solving and being able to check back in the plan at the time of or after carrying out the plan.

Likewise, the findings conform to the study of Arum, Kusmayadi, and Pramudya (2017) that students seem to make errors in an arithmetic operation still, and it is possibly caused by students' carelessness and inaccuracy while undergoing the computational process. Consequently, the overall level of analytical problem-solving skills of the Grade 11 senior high school students is 13.81 (38.36%) or poor. It indicates that the students demonstrate evidence of basic analytical problem-solving skills but require assistance. The students have minimal ability to scrutinize and breakdown facts and thoughts and execute an appropriate solution to that problem or situation. Students at this level may investigate an unknown problem scenario and comprehend a small portion of it, as well as solve difficulties using a single, specific strategy or method. They can carry out plans one step at a time to achieve the goal and have some ability to monitor overall progress towards a solution.

According to the PISA 2012 results, 21% of students failed the test and did not achieve Level 2, which is a baseline level of proficiency at which students begin to demonstrate the essential problem-solving competencies that will enable them to participate effectively and productively in 21st-century societies. Furthermore, the findings found that only 11.4 percent of 15-year-old students in OECD countries are top problem-solvers, implying that many children are still performing poorly and remain at the fundamentals of problem-solving (OECD, 2014).

Moreover, these findings are supported by the results of the study of Silao (2018) that at about 43.16 percent of the students have not mastered problem-solving skills. It means that even though students have a low level of analytical problem-solving skills, they still have the basic ability to do it, and they need assistance from teachers and classmates with high analytical problem-solving skills.

The findings also conform to the results of the study of Said, Tasir, and Ismael (2017) that 38.8 percent (118) of the respondents had a very low-performance level in solving non-routine problems. It suggests that the students cannot translate available information in the problem into a comprehensible form, and hence, there are mistakes in extracting the information. Besides, the steps for the solution shown are ambiguous and confusing, and the methods and strategies used are wrong.

Also, the students have shown difficulty in providing proper justification and explanation for each process that they have undergone to come up with the solution. They failed to show how they came up with their answer through a solution process or computation.

C. Relationship between Emotional Intelligence and Analytical Problem-Solving Skills

Table 3 shows the relationship between emotional intelligence and analytical problem-solving skills in General Mathematics of the Grade 11 senior high school students. It includes the value of the correlation coefficient (r-value), which signifies the relationship between the variables and the significance value (p-value), which shows its significance..

	<i>r-value</i>	<i>p-value</i>	<i>Degree of Relationship</i>
Emotional intelligence and analytical problem-solving skills	0.306	0.000	Low positive relationship

Table 3: Relationship between emotional intelligence and analytical problem-solving skills in general mathematics

As reflected in Table 3, the computed r-value of emotional intelligence to the analytical problem-solving skills is 0.306, and it indicates a low positive relationship. It can be said that when emotional intelligence increases, the analytical problem-solving skills of the students also increases, and vice versa. Likewise, when the emotional intelligence of the students decreases, their analytical problem-solving skills will also decrease. Besides, since the p-value is less than the level of significance ($\alpha=5\%$) and thus, the null hypothesis of this study is rejected. It indicates that there is a significant relationship that exists between emotional intelligence and analytical problem-solving skills.

Further, the result implies that when the students have high ability to monitor their own and others' feelings and emotions, to differentiate among them and to use this information to guide their thinking and actions they will also likely to have high ability to identify and define problems, extract essential information from data in order to test and verify the cause of the problem and develop solutions to resolve the problems identified. Likewise, if the students cannot be aware of their own and others' emotions and they cannot manage their feelings, then they cannot also identify and find essential information in a problem, and develop solutions to given problems.

The result, therefore, confirms Goleman’s Emotional Intelligence Theory (1995) that the five dimensions of emotional intelligence are learned capabilities that can be honed to achieve outstanding performance, including analytical problem-solving skills. In addition, Bar – on Emotional Intelligence Model also confirms the result that emotional intelligence relates to the potential for achievement and success (Dhani & Sharma, 2017).

Moreover, Bance and Acopio (2016) confirmed that the more emotional-social intelligent academic achievers grow, the more likely they are to exude academic prowess. It also emphasizes the role of emotional intelligence in educational advancement and academic achievement. Also, the results of an experimental study on emotional

intelligence and Mathematics scores by Shafiee, Madji, Khoshkhou, and Rajabi (2016) showed that there is a significant positive relationship between all the components of emotional intelligence and student math scores.

Furthermore, the result of this study conforms to the study of Vicki, Pamela, Sian, Yvon, and Lynne as cited by Festus and Seraphina (2015) showed that there is a significant positive correlation between emotional intelligence and academic achievement in Mathematics of the students. In addition, Al Abdallat (2016) pointed out that there is a statistically significant relationship at the 0.01 level of significance between the dimensions of emotional intelligence and problem-solving skills among university students.

D. Emotional Intelligence Dimensions Influencing Analytical Problem-Skills

Table 4 illustrates the dimensions of emotional intelligence influencing the analytical problem-solving skills of the Grade 11 senior high school students.

Dimensions of Emotional Intelligence	Analytical Problem-Solving Skills (APSS)		
	β	<i>t</i>	<i>p-value</i>
Constant	0.479		
Self-awareness (x_1)	3.034	6.303	0.000
Self-management (x_2)	0.623	1.257	0.210
Self-motivation (x_3)	0.146	0.329	0.742
Empathy (x_4)	0.236	0.558	0.577
Social awareness (x_5)	0.277	0.597	0.551
R square (0.094)			
Regression Equation	$APSS = 0.479 + 3.034x_1 + 0.623x_2 + 0.146x_3 + 0.236x_4 + 0.277x_5$		

Table 4: Regression analysis of emotional intelligence dimensions and analytical problem-solving skills

The result denotes that only the self – awareness dimension has a significant influence on the analytical problem-solving skills of the students since its p-value is less than 0.05 level of significance. On the contrary, the self – management, self – motivation, empathy, and social awareness dimensions are deemed to have no significant influence on the analytical problem-solving skills of the Grade 11 senior high school students. Hence, the null hypothesis that none of the dimensions of emotional intelligence significantly influence the analytical problem-solving skills of senior high school students in General Mathematics is rejected.

It can be gleaned from the table that self – awareness greatly influences the students' analytical problem-solving ability. In other words, the extent at which a student is able to recognize, understand, and assess his or her emotions, strengths and weaknesses, or having an understanding of how they feel and why they feel that way also determines

his or her capacity to solve problems both complicated and straightforward General Mathematics problems.

Moreover, the study of Al Abdallat (2016) showed a significant relationship between self-awareness and problem-solving skills at 0.01 level of significance. It means that the moment a student can recognize and understand what he or she feels, and aware of his or her strengths and limitations, a student has the ability to solve problems independently. Further, Hess and Bacigalupo (2014) argued that problem solvers who are self-aware and can accurately and honestly assess their strengths in comparison to others in the organization have the advantage of leveraging the attributes of others in the problem-solving process.

In addition, the findings are also supported by Ylvisaker (2019) that self – awareness can greatly influence problems solving skills by the fact that when students resist problem-solving strategies and systems or fail to develop habits of problem-solving, it is often because of either weak awareness of or resistance to acknowledging their difficulties.

VII. CONCLUSIONS

Based on the findings of the study, the following conclusions are presented:

The level of emotional intelligence of the Grade 11 senior high school is average. The reason for having an average level of emotional intelligence can be accounted to the senior high school students age and maturity, and so, they had reached a degree of which they were able to monitor their own and others' emotions, and control and manage these emotions to create a more appropriate reaction and response to certain situations. Besides, the students' level of emotional intelligence could also be attributed to the interventions made by the guidance office, such as one-on-one conferences to students with low scores on psychological tests, and seminars about depression, and life success and challenges.

The level of analytical problem-solving skills of the Grade 11 senior high students in General Mathematics is generally not good at all. It suggests that the students have the poor ability to finding and applying approaches, strategies, and procedures needed in solving problems. Students having poor analytical problem-solving skills are attributed to their level of emotional intelligence. If the students are in distress and unstable emotion, they will likely have poor performance in analytical problem-solving.

There is a significant low positive relationship between the Grade 11 senior high school students' emotional intelligence and analytical problem-solving skills in General Mathematics. It implies that when the students have high ability to monitor their own and others' feelings and emotions, to discriminate among those emotions and to use this information to guide their thinking and actions they will also likely to have high ability to identify and define problems, extract essential information from data to test

and verify the cause of the problem and develop solutions to resolve the problems identified. Likewise, when students have a low level of emotional intelligence, they will also have poor analytical problem-solving skills.

Among the five dimensions of emotional intelligence, only the self – awareness is considered to have a significant influence and impact on the students' analytical problem-solving skills in General Mathematics subject. It can be inferred that the analytical problem-solving skill is greatly influenced by the moment a student is able to recognize and understand what he or she feels and aware of his or her strengths and limitations, a student has the ability to independently solve problems.

VIII. RECOMMENDATIONS

Based on the findings and conclusions of this study, the following recommendations are forwarded:

The Department of Education may encourage the school to formulate student programs and initiatives allowing students to engage in tasks that may enhance their emotional intelligence and analytical problem-solving skills. Moreover, they may conduct seminars, workshops, and training sessions to improve the students' emotional intelligence and analytical problem-solving skills.

Mathematics teachers may devise learning activities and performance tasks that will help hone students' analytical problem-solving skills, especially problem analysis and solution making where students are found to be poor. Furthermore, teachers may integrate learning activities and tasks that will help the students' emotional intelligence.

Students may be made aware of their emotional intelligence because this will guide them on how to enhance, control, and manage their emotional intelligence. This may lead to their increased ability to solve not only analytical problems in Mathematics but also real-life circumstances.

Parents may be provided with their children's emotional intelligence by the school through the Guidance Office and the students' analytical problem-solving skills from the teacher so that they can provide their children the necessary assistance and act if necessary. Through awareness, the parents may become active, educative stakeholders for the improvement of the students' Mathematics performance.

Future Researchers may conduct a similar study about emotional intelligence and analytical problem-solving skills with other learning areas in Mathematics. It is deemed ideal to have a bigger number of respondents from both public and private schools, as well as to increase the scope of the study from school-based to regional-based or even national-based.

ACKNOWLEDGMENT

The researcher would like to express his heartfelt gratitude and appreciation and render his warmest thanks to the following individuals who have encouraged, supported, and contributed to this research paper:

Dr. Sixto O. Daleon, the Chairperson of the Panel of Examiners, for giving opinions and ideas for the improvement and finalization of this research paper as well as for his patience, understanding and encouragement; Dr. Oscar J. Cervales and Engr. Arnell F. Mesina, the panel members, for giving thoughts and advice for the improvement of this study;

Engr. Leonardo M. Rulida, the researcher's adviser and statistician, for his heartfelt support and guidance for the whole duration of this thesis, for giving his time in reading my manuscript, and for giving advice and support, which led to the completion of this study.

Joey C. Oliveros, the school principal who served as one of the validators of the research instrument for this study, for allowing the researcher to conduct his study in the respondent school, for providing his full support in the conduct of the study, and for giving feedback to the research instruments used in the study;

The researcher is also deeply thankful to the respondents. He wishes to acknowledge and appreciate their help and transparency during his research because the information they provided have helped in the completion of this study;

The researcher's family and friends for their undying moral, financial, and spiritual support that encouraged him to finish this research study.

Special thanks to the researcher's mother, Olive Baltazar, the person with the greatest indirect contribution to this work, for her encouragement and all-out support;

Above all, to our Almighty God, for giving the researcher knowledge, strength, patience, wisdom, and fighting spirit which helped him to work and finish this research study.

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