INTERNATIONAL JOURNAL OF MULTIDISCIPLINARY RESEARCH AND ANALYSIS

ISSN(print): 2643-9840, ISSN(online): 2643-9875

Volume 07 Issue 09 September 2024

DOI: 10.47191/ijmra/v7-i09-26, Impact Factor: 8.22

Page No. 4336-4353

21st Century Learning Skills, Study Habits, and the Mathematics Performance of Grade 7 Students

Joy M. Corpuz

College of Graduate Studies, Ilocos Sur Polytechnic State College, Sta. Maria, Ilocos Sur, Philippines

ABSTRACT: This study examined the study habits, 21st-century learning skills, and mathematics performance of 132 Grade 7 students at Santa Maria National High School in the 2021-2022 school year. It looked at the kids' characteristics, study habits, and 21st-century learning skills to see how they correlated with their arithmetic ability. The study used a descriptive approach with tailored questionnaires, with data evaluated using frequency count, percentage, mean, and Spearman rho. The results revealed that the majority of pupils were of the suitable age, primarily female, lived in rural areas, and had parents working in a variety of occupations. They spent 1-4 hours a day on devices, with smartphones and the Brainly app being the most popular, and books were preferred as educational tools. The survey discovered that pupils had "very good" study habits, "high" 21st-century learning skills, and a "very satisfactory" level of mathematics achievement. There were no significant relationships observed between students' profiles and their study habits or 21st-century learning skills. However, there was a substantial link found between study habits and 21st-century learning ability. Communication and creativity skills were also found to be highly connected to math achievement. The study suggests that mathematics teachers integrate various applications, create interactive materials, and use teaching approaches that promote 21st-century abilities such as communication, creativity, and critical thinking through active learning, project-based, and problem-based projects.

KEYWORDS: 21st century skills, Mathematics performance, Learning skills, Study habits

I. INTRODUCTION

The challenges that people encounter in everyday life are becoming more complicated in the twenty-first century. The demand for problem-solving skills in a profession is also rapidly increasing. Modern society of the twenty-first century requires not just academic ability, but also abilities such as critical thinking, problem solving, creativity, invention, communication, and cooperation. One of the components required to build 21st-century abilities is mathematical literacy. Mathematics is one of the most important subjects taught in secondary school, with the main goal of providing and developing students' ability to analyze, conceptualizes skills, and thinks in a higher order so that they can advance to a higher endeavor and be ready to respond to the demands of the twenty-first century.

In many areas, mathematics uses information to depict problem-solving situations. It's a multidisciplinary field with a powerful collection of tools for comprehending the world. Because of its importance in education and to other careers, it is believed to be the basis in practically all parts of academia. As a result, having a sufficient level of mathematical proficiency is very important for the advancement of the world.

Mathematics is seen by society as the foundation of scientific technological knowledge that is vital in social economic development of a nation. It is in realization of the vast applications of mathematics that made Eraikhuemen (2003) to posit that a disciplined and ordered pattern of life can only be achieved through the culture of mathematics. Unfortunately, students' achievement in this important subject over the years has not been encouraging at the primary, secondary and tertiary levels of education in Ghana. According to the institute of Education, University of Cape Coast (U.C.C) Chief examiners report, the worst performance in the 2013 / 2014 academic year first semester examination for Colleges of Education in Ghana was in Mathematics (Numbers and Basic Algebra). The reports made available to the Colleges of Education indicated that 32.9% of the candidates who took the mathematics paper (Numbers and Basic Algebra) had the grades D or D+ and 20.9% failed in the subjects. Educators, trainers, and research workers have long been interested in seeking variables that contribute effectively for quality of performance

of learners. These variables are inside or outside school and affect students' quality of academic achievement. These factors may be termed as student factors, family factors, school factors and peer factors (Crosnoe, Johnson & Elder, 2004).

Mathematical performance among students is continuously addressed in different countries since it is seen as a crucial subject for the nation's growth and development. Students' mathematical knowledge and skills are critical in conquering challenges that they may confront in their daily life (Mohamed & Waheed, 2011). That is why, more than any other topic, there is a focus on the lessons that should be taught in mathematics in schools at various levels around the world (Orton & Frobisher, 2004). However, results from standardized national assessments revealed that students perform below expectations. Underachievement in mathematics is no longer a problem limited to a few countries, but has become a global worry in recent years (OECD, 2003). The Philippines is one of those countries where mathematics achievement, particularly in high school, is a topic of concern. The Philippines was placed 34th in mathematics out of 38 countries participating in the Trends in International Mathematics and Science Study (TIMSS) in 2003. Furthermore, according to the World Economic Forum's Global Competitiveness Report for 2016-2017, the country ranks 79th out of 138 participating countries in terms of mathematics education quality. The Philippines' Department of Education (DepEd) reported that the mean percentage score (MPS) for high school students was below the target performance of the learners in the National Achievement Test (NAT).

The twin goals of mathematics in the basic education levels or the K-12 are Critical Thinking and Problem Solving. Scriven and Paul (1987) as cited in the K-12 Curriculum Guide (2013) underscored that critical thinking is the intellectually disciplined process of actively and skillfully conceptualizing, applying, analyzing, synthesizing, and/ or evaluating information gathered from, or generated by, observation, experience, reflection, reasoning, or communication, as guide to belief and action. On the other hand, Polya as detailed in the K-12 Curriculum Guide(2013) explained that mathematical problem solving is finding a way around a difficulty, around an obstacle, and finding a solution to a problem that is unknown.

The mentioned two goals are to be achieved with organized and rigorous curriculum content, a well-defined set of high – level skills and process, desirable values and attitudes, and appropriate tools, taking into account the different contexts of Filipino learners.

On the other hand, one of the things that might have a significant impact on students' performance is their study habits. If the persons concerned do not pay attention to this, the effect on students' performance may increase Ebele & Olofu (2017). To succeed in life, students must have good study habits because it is their study habits that help them acquire relevant and applicable knowledge. As a result, if these skills are lacking, students will struggle in school Kaur & Pathania,(2015). When students do not acquire the necessary skills in math, their understanding of the advanced topics will be affected . If this matter is left unresolved, it will foster a bad attitude toward mathematics, which most pupils regard to be a tough subject. As a result, the students' performance would be affected.

It is necessary to emphasize those factors in order to reduce the rate at which students' mathematical skills are deteriorating. Despite the many innovative teaching tactics established today, and despite the fact that Mathematics is a fascinating topic for certain students, the majority of students find it difficult, intimidating, and depressing, and as a result, mathematics performance remains poor.

With the advent of the 21st century, the world has experienced a time of great change in all areas, be it education, global trade, and the economy, technology, or society. Recently, the covid-19 epidemic presents challenges to humans to cope with its effects. Naturally, in such cases, a different skill is needed that will enable the individual to cope with the problems and succeed in coping with the challenges of real life, leading to his full development. These skills are referred to as 21st Century skills. The school, as the primary training ground, must continue to identify the abilities that 21st-century learners will need to survive in the 21st-century world. They must develop the essential abilities that are important in all disciplines and occupations in order to deal with these changes, which we call the Four C's of 21st-century learning: critical thinking, communication, collaboration, and creativity.

As identified by the United States-based Partnership for 21st Century Skills, the four C's are the essential skills required for 21st-century education. Therefore, 21st Century Skills are skills that a student's needs in order to fully develop in order to contribute to the development of his or her community, nation and land. Preparing students with the integration of the four C's will be the path of education to be globally competitive (Duncan, 2011).

According to Paige (2009) adopting a 21st - century curriculum should blend knowledge, thinking, innovation skills, media, information and communication technology literacy, and real-life experience in the context of core academic subjects. To achieve authentic learning that demand in the 21st century, students engage in the learning environment. In this way, students will prepare with the necessary knowledge and life skills that will help them be successful in their future careers (Lombardi, 2009)

The role of teachers in the 21st century should help every student to learn. It encourages creativity, encourages collaboration, anticipates and rewards critical thinking, and teaches children not only communication, but also the power of active communication. These are the skills students need to develop in order to be successful in today's dynamic and future workplace.

If we want to provide every student with 21st century education, we must encourage in-depth learning through meaningful integration of solid educational content and experience that deliberately develops the skills, minds, and literature needed for students to become lifelong students and contribute regularly - changing the world.

On the other hand, as a Mathematics teacher for more than a decade in an National High School, the researcher observed that the performance of the Grade 7 students is deteriorating and lot of students are having difficulty on Mathematics. Furthermore, students do not intend to get high performance but just to comply and pass the subject. It is indeed very difficult for the teachers to have their students achieve high level of performance in the subject because they do not realize the significance of learning the Mathematical skills in everyday life and a lot of students fails to developed an adequate understanding of mathematics concepts, logically reasoning and problem-solving skills. In addition, the researcher observed that students nowadays are weak in their communication skills. Some could not express their ideas fluently or they cannot explain how solutions to a problem are arrived. Some students do not have the ability to think in higher order. They do not like to improve their ways of thinking if they encountered a certain problem that requires deep understanding and analyzation. They just ignore or simply answering without thinking. The lack of understanding in learning mathematics often causes discouragement among the students, which in variably lead to poor performance. Many are unable to extract necessary information from given data and many more are unable to interpret answers and make conclusions.

To succeed in today's globally and digitally interconnected society, all students require creative skills and knowledge. Chances to learn 21st-century learning skills are necessary if we want to prepare our children for success in school, employment, and life. As a result, the researcher conducted this study to assess the Grade 7 students' 21st century learning skills, study habits, and mathematical performance. These 21st-century learning skills are more important than ever for today's youth. It not only provides a foundation for successful learning in the classroom, but also ensures that students will thrive in a world where change is constant and learning never stops. The DepEd vision of offering high-quality education in a more holistic manner will be fulfilled in this way, without compromising other aspects of students' development.

II. RESEARCH METHODOLOGY

Research Design

The researcher used the descriptive research design. According to Manuel and Medel (1976), descriptive research describes what is. It involves the description, recording, analysis and interpretation of the present nature, composition or processes of phenomena. The focus is on the prevailing condition, or how a person, group or thing behaves or function in the present. It is often involving some type of comparison and contrast. In this study, it describes the profile of the respondents, their level of 21st century skills and their performance in Mathematics.

In addition, it also utilizes correlational method to make an in-depth analysis of the relationships among variables and seeking to establish a causal connection. The correlational method is use to assess and the extent of relationship between the student's profile with the level of 21st century skills and performance in Mathematics of the Grade 7 students.

Population and Locale of the Study

Table 1 present the distribution of samples. The study was conducted at Santa Maria National High School, Santa Maria Ilocos Sur.

Table 1. Distribution of Respondents by Section

Section	Population, N	Sample, n
Acacia	41	13
Narra	42	13
Mahogany	42	13
Tanguile	43	14
Molave	42	13
Gmelina	42	13
Kamagong	41	13
Talisay	41	13
Lauan	43	14
Yakal	41	13
Total	**418**	**132**

The respondents of the study were the Grade 7 Students of Santa Maria National High School for the school year 2021-2022, with a total population of 418. A total of 132 respondents were involved and determined using G power at an effect size of 0.10. Proportional sampling was also employed to compute the sample size per section. The simple random technique was used to determine the respondents of the study.

Research Instrument

This study primarily used a questionnaire. It had two (2) parts: part one was the participant's profile, and part two is a questionnaire on study habits and on the 21st-century learning skills in terms of critical thinking, communication, collaboration, and creativity. It is adapted from the study of Omayana (2019) on the utilization of 4 Cs among High School Learners and Tan (2014) on study habits. Modifications were made on the, however, for purposes, pilot-tested in Burgos National High School, Burgos, Ilocos Sur with the following results. It is computed using Cronbach's alpha.

Table 2. Reliability coefficient of the questionnaire

Indicators	Reliability Coefficient	Interpretation
Study Habits	0.856	Good
Learning Skills		
Critical Thinking	0.845	Good
Communication	0.865	Good
Collaboration	0.888	Good
Creativity	0.895	Good

Legend: ≥0.8 – Good

All the variables obtained a reliability coefficient of ≥0.8 with an interpretation of good. This means that the instrument is deemed reliable. For validity purposes, it was validated by five experts in Mathematics with a computed mean of 4.63, thus, the questionnaire is valid.

Data Gathering Procedure

The researcher sought permission to conduct the study to the School Principal and advisers of all sections involved in the study. After granting the request, the researcher provides orientation to the participants on the nature and purpose of the study. The researcher thoroughly explained the items in the questionnaires to enable the participants to respond accurately. After the test, the results were tabulated and analyzed. Then the computed data were further analyzed using the appropriate statistical tools.

Statistical Treatment of Data

The study used the following test statistics for in-depth analysis.

The **profile and percentage** were used to described the profile of the respondents of the study.

The **mean** was to determine the level of study habits, the level of 21st century learning skills and the level of mathematics performance.

The **spearman rho** was used to find out if there is a relationship between profile and level of study habits, profile and the level of 21st century skills, profile and mathematics performance, level of study habits and level of 21st century learning skills, the level of study habits and the and mathematics performance and the level of 21st century learning skills and the mathematics performance.

Data Categorization

The researcher used the following scales to interpret the gathered data:

A. Study Habits

Rating	Range	Item Descriptive Rating	Overall DR
5	4.21 – 5.00	Strongly Agree	Outstanding
4	3.41 -4.20	Agree	Very Good
3	2.61 – 3.40	Moderately Agree	Good
2	1.81 – 2.60	Fairly Agree	Fair
1	1.20 – 1.80	Disagree	Poor

B. 21st Century Learning Skills of Learners

Rating	Range	Item Descriptive Rating	Overall DR
5	4.21 – 5.00	Strongly Agree	Very High
4	3.41 -4.20	Agree	High
3	2.61 – 3.40	Moderately Agree	Moderate
2	1.81 – 2.60	Fairly Agree	Fair
1	1.20 – 1.80	Disagree	Low

C. Mathematics Performance

Range	Descriptive Rating
90-100	Outstanding (O)
85-89	Very Satisfactory (VS)
80-84	Satisfactory (S)
75-79	Fair (F)
Below 75	Did not Meet Expectation (DNME)

III. RESULTS AND DISCUSSIONS

Profile of the Respondents

Age. The results revealed that 67 or 50.76% and 63 or 47.73% of the respondents are within the average years for Grade 7 students which are 12 and 13 years old, while only one or 0.76% of the respondents entered grade 7 at ages 14 and 15.

This indicates that the respondents were in the correct age group when they started Grade 7. The students started their basic formal education at the age of 5. This result supports Bongolan's (2018) findings that students are on their right age as they enter the seventh grader and it is normally that 12 or 13 years old when they enter high school.

Gender. The data shows that there are more female students than male students, as evidenced by the numbers 88 (66.7%) and 44 (33.3%), respectively. This means that there are more female students in Grade 7 than male students. This result affirms by Gloria (2015), that females exceeded the distribution of male students. Female students from the national high schools form the 55.7 percent of the total research population. Also, Usaini and Abubakar (2015) confirm to the findings of the previous study where it was found out that 50.9 percent of the students from secondary schools are girls. Moreover, O'Sullivan, et al. (2014) concluded the same. In their study, female respondents form two – thirds of the sample, while only one – third is males.

Parents Occupation. The results demonstrated that most of the heads of the family are not belong to the given options such as agriculture, business, fishery and government. This is indicated by the frequency and percentage which is 71 and 53.79%. This 53.79% are composing of OFW, Construction Workers, Drivers and Carpenters. Also, representing a big chunk in the total population of fathers employed in agriculture as indicated by their number 37 or 28.03%. This is supported by the study of Milan (2018), he found out that 66 or 43.42% of their fathers have occupations related to agriculture. The least occupation of the father is in the field of government, there are just a few frequencies and percentage for this occupation which is indicated by 6 out of 132 total populations with a certain percentage of 4.55%. In a similar sense, Gabriel (2012) states that only nine percent of the parents are working as professionals, either in government or private sector. While, the data on mother's occupation revealed that the majority of 68.18% or 90 are in other domains which are housekeepers, ofw and private workers, which is not surprising because these jobs are usually done by women, living at home doing various household chores. Followed by business with a frequency of 17 and a percentage of 12.88%, likewise in the field of agriculture there are 14 mothers or 10.61%. The least count which is 11 or 8.33% is in the field of government.

This result claims the findings of Barcelona (2017) that most of the parents in the same school were farmers, housekeepers, laborers and non – professional jobs.

Father and Mother's Educational Attainment. The highest recorded count and percentage is 45 or 34. 09% which belongs to the respondents whose father graduated from college while the least count is the post graduate as indicated by the number 1 or 0.76%. This means that a lot of father afforded to go higher education because they know the importance of education in their lives. This affirms the study of Leones (2018) that the father of her respondents in Santa Maria National High School were mostly college graduate. It also supported by Milan (2018) by his study that the father's educational attainment of his respondents are college graduates with the highest frequency of 41. This implies that high level educated parents have more influence on their children to achieve and perform well in their studies at secondary school level. Parents with higher level of education show much interest in the academic performance of their children. Khan (2015). On the other hand, covering 39.39% of the total sample of respondents are the students whose mother have finished college with a frequency of count of 52. However, those mothers who

did not attend college and just finish or graduated high school is next to the rank with a frequency of 33 and percentage of 25%. The least tallied frequency count belongs to the mother whose pursued a post college course and a mother who did not graduated to elementary. Leones (2018) affirm the findings as she found that 40.51% of her student respondents have parents who have achieved their college diploma. It has been noted that according to Aguila (2015) that the higher the educational attainment of parents, the higher the learning and innovations skills among learners. It also supported by Milan (2018) by his study that the mother's educational attainment of his respondents are college graduates with the highest frequency of 48.

Place of Residence. The data gathered shows that all the respondents are found to be residing in rural barangays. This is expected because the school is also a rural public school. This result affirms by the study of Leones (2018) that all her respondents are living in a rural place. According to Gabriel (2012) cited by Milan (2018) most students are residing in rural areas. The study disclosed that 81.06% or 488 out of 602 students live in a place away from the town. The remaining 18.94% claims they live near or within the town proper.

Gadgets Used. There are 118 out of 132 respondents who used smartphones with a percentage of 89.39%. Smartphone is the most gadgets used by the respondents because of its multiple features that can provide to the users. This is in consonance to the findings of Alfawareh and Jusoh (2014) which revealed that ninety four percent of students owned smartphones, and majority of them used like mobile by using as a computer connected to internet and a digital camera. Laptops is the least tallied and percentage gadgets by the respondents by 1 or 0.76%. This implies that academic learning is now innovative as a result of smartphone and other media in promoting and advancing 21st century needed skills and knowledge (Tulenko & Bailey, 2013; Emerson & Berge, 2018). It affirms by the study of Kumar (2018) that he found in his study that most commonly used gadget was found to be smartphones, with 90.5% of study participants using it.

Number of Hours of Using Gadgets Despite of being members of the millennial age, there are only 53 out of 132 or 40.15 % use gadgets in 1-4 hours as shown in figure 9. This means that respondents are giving more time with other activities such as doing household chores and spending in school activities. This finding is supported by the study of Bongolan (2018) that 28.33% used gadgets for one to four hours. The result of this study is contradicting to the study of Kumar (2018) that he found out in his study that out of 90.5% study subjects it was found that majority 50.2% were using smart-phones for more than 7 hours a day.

Commonly Used Apps. Data revealed that 87 or 65.91 % of the student – respondents choose brainly as their commonly used apps ant the least tallied apps used by the respondents is the photoMath. With mobile apps, students can effortless access the entire world of information (Khaddage et al., 2011; Caudill, 2007). No need for them to carry loads of books to school and is environmentally friendly as well. It is common knowledge that today's students are quite comfortable with technological gadgets and equipment, and the need to employ these gadgets and equipment in the classroom is highly evident.

Instructional Materials Used at Home. The instructional materials mostly used by the student–respondents in their home is the book with a frequency of 74 and a percentage of 56.06%, followed by the study guide with 32 or 24.24 % and the least tallied instructional materials is the pamphlets with 1 or 0.76%. These instructional materials are the tools used in educational lessons, which includes active learning and assessment of the students.

Table 3. Level of Study Habits of Grade 7 Students

Indicators	Mean Score	Descriptive Rating
1. I study where it is quiet and has few distractions.	4.02	(A)
2. I try to study during my personal peak time of energy to increase my concentration level.	4.11	(A)
3. When I doubt the correct solution for a problem, I refer the book to provide a guide to follow.	4.33	(SA
4. If time is available, I take a few minutes to check over my answers before turning in my examination papers.	4.45	SA)
5. When test papers are returned, I find time to review the questions that I missed.	4.22	(SA)
6. I quiz myself over material that could appear in future exams and quizzes.	3.88	(A)
7. I prefer to study my lessons alone rather than with others.	4.18	(A)
8. I have enough time for school and fun.	4.34	(SA)
9. I take notes as I read my textbooks.	4.04	(A)
10.I give special attention to the accuracy and neatness of solutions to problem sets and other works to be turned in.	4.17	(A)

11. I study three or more hours per day outside class.	3.85	(A)
12. I say difficult concepts out loud in order to understand them better.	3.86	(A)
13.I complete my homework/assignments on time.	4.48	(SA)
14. I copy the diagrams, drawings, tables, and other illustrations.	4.05	(A)
15. I keep my assignment up to date by doing my work regularly from day to day.	4.25	(SA)
16. I utilized the vacant hours between classes for studying so as to reduce the evening's work.	3.99	(A)
17. I ask my teacher for further explanation of an assignment that is not clear to me.	3.95	(A)
18. For me, studying is hit–or–a miss proposition depending on the mood I'm in.	3.64	(A)
19. I make questions from a chapter before, during, and after reading it.	3.80	(A)
20. I care about the solutions when answering examination questions.	4.28	(SA)
21. I memorized rules, definitions of technical terms, formulas, etc. without really understanding them.	3.78	(A)
22. I checked returned examinations, reports and homework's/assignments to correct errors noted by the teacher.	4.27	(SA)
Overall Mean	**4.09**	**VG**

Legend: Range	Item Descriptive Rating	Overall DR
4.21 – 5.00	Strongly Agree (SA)	Outstanding (O)
3.41 -4.20	Agree (A)	Very Good (VG)

This portion shows the results of the study habits of the respondents. The indicator that has the highest means were: "I complete my homework/ assignment on time" and "If time is available, I take a few minutes to check over my answers before turning in my examination papers" with a computed mean of 4.48 and 4.45 respectively.

This implies that the respondents are aware of the importance of assignment and examinations. They are having a good study habit on managing their time in accomplishing their assignment and examination. Respondents are knowledgeable that completing assignment on time teaches them on how to take an active part in their own education. It shows their being responsible on what they had learn, how they learn and how much they remember their lesson. This can promote some deep thinking, as well as helping the respondents to see the bigger picture of life.

According to Kaur & Pathania (2015), to succeed in life, students must have good study habits because it is their study habits that help them acquire relevant and applicable knowledge. While the indicators having lowest mean are: "With me, studying is hit–or–miss proposition depending on the mood I'm in" with a mean of 3.64 (A) and "I memorized rules, definitions of technical terms, formulas, etc. without really understanding them" with a mean of 3.78. The two lowest indicators are the study habits of the respondents wherein they are not really agree of learning anytime and understanding the lesson. The students are aware of these indicators of study habits that might affect their mathematics performance.

On the hand, the item for me, studying is hit–or–miss proposition depending on the mood I'm in with a computed mean of 3.64 described as Agree. This indicates that learners lack planning in their studies. They are after compliance and not on the mastery of the competencies that the teachers wanted to develop. According to Brenton (2016), encouraging student to focus and seriously take their lessons is a one of the real challenges teachers encountered in teaching mathematics.

The table shows the overall weighted mean of 4.09 as described as **VG**. This means that the respondents had high study habits. The data shows that the study habits of the respondents are in good level. Mathematical concepts most of the time involve computations and problem solving which require students to practice not only in school but also at home that is why teachers usually give assignments to students for them to practice the skills.

According to Odiri (2015) study habits play a significant role in determining the quality of education and achievement of students in mathematics since students cannot grasp all the learning they need on the subject from their teachers inside the class.

Table 4. Level of 21st Century learning Skills of Grade 7 Students along Critical Thinking

Indicators	Mean Score	Descriptive Rating
1. I can understand the link/ connection between mathematical concepts.	3.72	A
2. I can see the importance of mathematical concepts.	3.90	A
3. I think of solving mathematical problem in an objective way.	3.84	A

4. I solve problems independently.	3.71	A
5. I try to look for other solutions to mathematical problems.	3.86	A
6. I evaluate generated problem solutions.	3.80	A
7. I put critical thinking skills with mathematical concepts to be used in aspects of everyday life.	3.77	A
8. I develop my reasoning skills using mathematical solutions regularly.	3.81	A
9. I manifest in the skillful manipulation of my own mathematical solutions.	3.72	A
10. I can compare mathematical solutions.	3.76	A
Overall Mean	**3.79**	**High**

Legend:	Range	Item Descriptive Rating	Overall DR
	3.41 -4.20	Agree (A)	High

The table shows the level of critical thinking skills among grade 7 students of Santa Maria National High School. The item I can see the importance of mathematical concepts obtained the highest mean of 3.90 described as Agree. This means that the students see the value and application of the mathematics concepts in their daily lives. They agree that mathematics is essential in performing their real-life activities. The respondents also agree that mathematics concepts are incredibly important in their present and future lives. This result affirms by the study of Aguila (2015), which she found out that the student of Nueva Vizcaya University has a high level of critical thinking skills.

Meanwhile, the item I solve problems independently obtained the lowest mean of 3.71 described as Agree. The result suggests that students find ways to work without the supervision of others. The students may seem to be working by themselves on independent work in the classroom or at home.

Overall, the learning skills of the learners in terms of critical thinking has a computed mean of 3.79 described as High. This manifests that students think and work systematically to develop logical and critical thinking of the learners in learning mathematics. It further implies that students can integrate the concepts of mathematics in solving problems. Jacob (2012) agree that teachers shall encourage students to think independently and solve problems in school or in the context of everyday life. According to Facione (2011) the most basic concept of critical thinking is the ability of interpretation, analysis, evaluation, inference, explanation and self-regulation. Rajendra (2010) claimed that present curriculum shall require students to use new information or manipulate existing knowledge and information so as to obtain reasonable responses to new situations.

Table 5. Level of 21st Century learning Skills of Grade 7 Students along Communication

Indicators	**Mean Score**	**Descriptive Rating**
1. I can communicate solutions effectively with others.	3.83	A
2. I ask questions if received solutions are not clear to me.	4.05	A
3. I convey clear meanings of mathematical concepts.	3.78	A
4. I keep communication of mathematical concepts confidential when needed.	4.02	A
5. I am an active listener.	4.08	A
6. I believe being skillful in communicating solutions provides freedom to express my thoughts/feelings properly.	4.20	A
7. I can express my mathematical ideas clearly.	3.71	A
8. I use mathematical symbols to help me express my thoughts/feelings to others from mathematical solutions.	3.80	A
9. I see to it that I interpret solutions clearly.	3.83	A
10. I respect other people's solving processes.	4.45	SA
Overall Mean	**3.97**	**High**

Legend:	Range	Item Descriptive Rating	Overall DR
	3.41 -4.20	Agree (A)	High

Table 5 reveals the level of communication among Grade 7 students of Santa Maria National High School. The item I respect other people's solving processes obtained the highest mean of 4.45 described as Strongly Agree. This means that the

students respect other's way of communicating their ideas and processes in mathematics. As revealed in the study of Lasala (2014), the communicative competence of the students is acceptable. Also, there are indications that communication-skills exercise could develop in preparing students for success.

Meanwhile, the lowest mean average of 3.71 was the rationale which believes that he/she can express mathematical ideas clearly, which means that they are capable of expressing their thoughts and ideas properly. They are able to communicate mathematical reasoning and ideas clearly to another person. According to Tinungki (2015), good communication skills should be built in the learning process. Improving the students' mathematics communication ability should be hand in hand with the learning process. The ability of the students can be optimized when a learning model which gives chance for the students to discuss and interact each other is implemented.

On the overall, the respondents have a high communication skill as evidenced by the computed overall mean of 3.97. This indicates that students have good communication skills in mathematics. They believe that their communication skill is an important component of their basic education training. According to Mujiasih, Waluyo, Kartono and Mariani (2021), communication skills in mathematics is a fundamental skill needed by the students. Contrary to the present study, Rohid and Rusmawati (2019) claimed that communication skills in mathematics are still needed to be developed. Mathematics teachers should consider that they should not only teach mathematics but also the students' mathematical communication skills through creative and innovative learning activities.

Table 6. Level of 21st Century Learning Skills of Grade 7 Students along Collaboration

Indicators	Mean Score	Descriptive Rating
1. I take time to respond to group problems and needs.	4.05	A
2. I facilitate contributions of group members to solve mathematical problems.	3.88	A
3. I participate in a class mathematics project to attain a common goal.	4.09	A
4. I contribute to group mathematics assignments.	4.08	A
5. I foster a constructive group climate.	3.80	A
6. I love to work when it is done by group.	3.97	A
7. I believe that teamwork is essential to arrive to a clearer solution at all times.	4.42	SA
8. I analyze problems without blaming others.	4.11	A
9. I consider each one's weakness.	4.02	A
10. I can communicate solutions effectively with others.	4.05	A
Overall Mean	**4.05**	**High**

Legend:	Range	Item Descriptive Rating	Overall DR
	3.41 -4.20	Agree (A)	High

Table 6 shows the level of collaboration skills among Grade 7 students of Santa Maria National High School. The item I believe that teamwork is essential to arrive to a clearer solution at all times obtained the highest mean of 4.42 described as strongly agree. This implies that the spirit of teamwork, cooperation and collaboration is vital in developing the learning skills of students in mathematics. Students learn better when they work in an environment where collaboration exist between them and their peers. Hassain, Tarmizi and Ayub (2012) claimed that collaboration among learners in class is an effective strategy with the aim to improve student achievement and communication skills.

Overall, collaboration skills got an weighted mean of 4.05, which is at a high level. This means that the learners practice collaboration in accomplishing their task in the classroom. A study by Prichard, Stratford, & Bizo (2006), found that training college learners how to work together improves the effectiveness of collective learning. In other words, having better collaboration skills yields better results in collaborative learning contexts. The result of this study affirms by the result of the study of Varona (2018) that the level of collaboration skills among Grade 12 students is at a high level.

Learning Environment of Grade 9 Students

Table 7. Level of 21st Century learning Skills of Grade 7 Students along Creativity

Indicators	Mean Score	Descriptive Rating
1. I consider myself as a creative person by integrating solutions to arts and aesthetics.	4.11	A
2. I am self-motivated to use my imagination in solving mathematical problems.	4.05	A
3. I like to do creative works in mathematics class.	3.98	A
4. I explore different perspectives in mathematics.	3.81	A
5. I make connections to mathematical solutions to ideas.	3.98	A
6. I enjoy doing creative works to further understand mathematical solutions.	4.14	A
7. I examine solutions carefully to understand what they mean.	4.16	A
8. I organize my ideas well so that my classmates will be able to understand what I suggest.	4.16	A
9. I have a particular time during the day when I do most of my creative Works in mathematics.	4.03	A
10. I have a particular place where I do most of my mathematics works.	4.09	A
Overall Mean	**4.05**	**High**

Legend:	Range	Item Descriptive Rating	Overall DR
	3.41 -4.20	Agree (A)	High

Table 7 indicates the level of creativity. The indicators " I examine solutions carefully to understand what they mean" and " I organize my ideas well so that my classmates will be able to understand what I suggest" has the highest average of 4.16. " I explore different perspectives in mathematics" has the lowest average of 3.81. In the light of creativity, overall, it reveals that there is a high level of the said skill with an average of 4.05 with a high level. Based on Hall (2017), teachers can promote creativity by planning tasks and activities. Being creative should not be disregarded based on the Revised Bloom's Taxonomy since it is the highest order thinking skills (Anderson & Bloom, 2001).

Table 8. Summary on the 21st Century Learning Skills of Grade 7 Students

Indicators		DR
Critical Thinking	3.79	High
Communication	3.97	High
Collaboration	4.05	High
Creativity	4.05	High
Overall	3.97	High

Legend: 3.41 - 4.20 - High

As gleaned in Table 8, the 21st century learning skills of Grade 7 students are high with an overall mean of 3.97. This means that the Grade 7 students have a very good 21st century learning skills. This result affirms by the study of Aguila (2015), which she found out that her respondents have a "very good" 21st century skills along the three major areas of Learning and Innovation Skills, Information Media and Technology Skills as well as Life and Career Skills. Along Learning and Innovation Skills, all dimensions of creativity and innovation, critical thinking and problem solving as well as communication and collaboration skills are "often' manifested; hence are generally "very good as 21st century skills. Sahin (2009) also claimed that people have to have high level thinking skills called 21st century learning skills in order to solve new problems of the new world. They should know how to use their knowledge and skills.

Table 9. Level of Mathematics Performance of the Student

Range	Frequency	Percentage	Descriptive Rating
90-100	39	29.545%	Outstanding
85-89	35	26.515%	Very Satisfactory
80-84	34	25.758	Satisfactory

75-79	24	18.182%	Fairly Satisfactory
Below 75	0	0	Did Not Meet Expectations
Total	**132**	**100.00%**	
Final Average Grade		**85.70 (VS)**	

This section presents the performance of the respondents in mathematics, which are based on their first to third grading grades. As reflected in the table, 39 or 29.545% of the student – respondents obtained a final grades equivalent to 90 -96 with a descriptive rating of outstanding. This result is followed by a 35 student- respondents who obtained a grade of 85 – 89 or very satisfactory. Students whose grades are from 80 – 84 has a frequency and percentage of 34 and 25.757% respectively and the least tallied with a frequency of 24 or equivalent to 18.182% of the total sample population are respondents with a grade from 75-79. No one among the respondents have a grade below 75.

Overall, the final average grade of the respondents is 85. 70 % with a descriptive rating of **Very Satisfactory.** This implies that the mathematics performance of the respondents are still high, students are still interested in mathematics. This result affirm by Balbalosa (2010) cited by Milan (2018), found out that most of the students obtained grades in Mathematics equivalent to the descriptive rating of Very Satisfactory. Moreover, half of the respondents obtained grades lower than 89 while the other half obtained grades higher than 89. This indirectly states that 50% of the students perform very satisfactorily or even excellent. It is contrary to the study of Bongolan (2018), which she found out that most of her respondents have **Fairly Satisfactory** level of mathematics performance with a registered frequency of 81 or 67.50 %.

Table 10. Relationship between Profile and Study Habits of Students

Profile	rho	p-value	Interpretation
Age	-0.027	0.763	Not Significant
Gender	-0.060	0.491	Not Significant
Occupation of Father	0.011	0.903	Not significant
Occupation of Mother	0.088	0.313	Not Significant
Educational Attainment of father	0.003	0.969	Not Significant
Educational Attainment of Mother	-0.145	0.097	Not Significant
Place of Residence	α	α	α
Number of Hours of Using Gadgets	0.002	0.981	Not Significant
Apps Used	0.119	0.172	Not Significant
Gadgets Used	-0.014	0.874	Not Significant
Instructional Materials Used at Home	0.001	0.992	Not significant

a – cannot be computed because at least one of the variables is constant

As shown in the table, there's no significant relationship exist between the profile of the students and their study habits as indicated by a correlation along the following profile: age, r= -0.027; gender, r= -0.060; Occupation of Father, r= 0.011; Occupation of Mother, r= 0.088; Educational Attainment of father, r= 0.003; Educational Attainment of Mother, r=-0.145; Place of Residence, r = α; Number of Hours of Using Gadgets, r=0.002; Apps Used, r= 0.119; Gadgets Used, r=-0.014; Instructional Materials Used at Home, r=0.001. This implies that none of the profile variables show significant relationship to the study habits of the learners. There might be other variables which are not considered in the study that are significantly related to their habits in learning.

Table 11. Relationship between Profile and 21st Century Learning Skills

Profile	rho	p-value	Interpretation
Age	0.058	0.509	Not Significant
Gender	0.064	0.467	Not Significant
Occupation of Father	0.090	0.303	Not Significant

Occupation of Mother	0.035	0.693	Not Significant
Educational Attainment of father	-0.007	0.937	Not Significant
Educational Attainment of Mother	-0.081	0.356	Not Significant
Place of Residence	a	α	α
Number of Hours of Using Gadgets	0.055	0.535	Not Significant
Apps Used	-0.061	0.490	Not Significant
Gadgets Used	0.009	0.922	Not Significant
Instructional Materials Used at Home	0.000	0.998	Not Significant

a – cannot be computed because at least one of the variables is constant

It can be noted from the table that none of the profile variable show significant relationship to their level of 21st century learning skills. All the p-values greater than 0.05. The researcher fails to reject the number hypothesis stating that there is no significant relationship between the demographics of learners and their level of 21st century learning skills.

Molano, Cammano, Dioses and Dioses (2020) pointed out that the acquisition of the 21st century learning skills is influenced by the profile of respondents. Age has been reported to have significantly influenced the development of the learning skills. Corpuz and Tindowen (2021) also claimed that sex significantly influence the 21st century learning skills of the learners. The learners are provided equal opportunities for the students to learn 21st century skills regardless of their age, gender, occupation of father, occupation of mother, educational attainment of father, educational attainment of mother, place of residence, number of hours of using gadgets, apps used, gadgets used and instructional materials used at home.

Table 12. Relationship between Study Habits and 21st Century Learning Skills

21st Century Learning Skills	rho	p – value	Interpretation
Critical Thinking	0.482**	0.000	Significant
Communication	0.429**	0.000	Significant
Collaboration	0.380**	0.000	Significant
Creativity	0.337**	0.000	Significant

**significant at 0.01

As shown in the table, the relationship between study habits and the 21st century learning skills such as; critical thinking, communication, collaboration and creativity were found to be significant. The computed p-values are less than the critical values of 0.01 at two-tailed. The result suggests that the higher level of study habits of the students the better performance of the students in their 21st century learning skills.

Critical thinking skills of the learners is significantly related to the study habits. This is supported by the computed correlation coefficient of 0.482 with a p=0.000. This indicated that students with better study habits has the ability to think critically and rationally, and understand the logical connection of ideas. Good study habits lead student to rigorously question ideas and assumptions rather than accepting them at face value. They will always seek to determine whether the ideas, arguments and findings represent the entire picture and are open to finding that they do not. They can identify, analyse and solve problems systematically rather than by intuition or instinct. Karbalaei (2012) pointed out that the development of good study habits contributes to the development of the cognitive intellectual capabilities of learners. To improve the critical thinking of the learners, Bulgurcuoglu (2016) claimed the need to improve the study habit of learners. As the study habits of the learners increases, their critical thinking levels also increases.

Secondly, communication skills reported significant relationship to study habits with a computed correlation coefficient of 0.429 with computed p-value of 0.000. This implies that the better study habits of the learners have influenced significantly the development of the communication skills of the learners. When the students perform regularly and habitually in order to accomplish the task of learning, their skills in communication are enhanced.

In addition, collaboration post a significant relationship to study habits as evidenced by the computed correlation coefficient of 0.380 with p-value of 0.000. This implies that students with good study habits practiced collaboration with their peers and classmates. They work as a team rather than as individual. Practicing good study habits gives the students the opportunities to collaborate and work together to achieve a task.

Furthermore, creativity is significantly related to study habits with a correlation coefficient of 0.337 with computed p-value of 0.000. This indicates that learners with good study habits practiced creativity in accomplishing their mathematics tasks and activities.

Table 13. Relationship between Study Habits and the Mathematics Performance of the Respondents

Indicator	rho	p - value	Interpretation
Study Habits	-0.025	0.777	Not Significant

As seen in the table, the computed value of r is -0.025, which indicates that the study habits and mathematics performance of the respondents don't have a positive correlation. The results also show that study habit does not contribute to students' achievement in mathematics. Further, the test on the significance of their relationship shows that the p-value of 0.777 is higher than the significance level of 0.05 (0.777 > 0.05), which indicates that the null hypothesis is not rejected. This suggests that the study habits of the respondents do not contribute to their performance in math.

The result is parallel to the study of Tus (2020). The study pointed out that study habits do not significantly affect high school students' academic performance. This is contradicted by Rabia, Mubarak, Tallat and Nasir (2017) stating that habits contribute significantly in the development of knowledge and perceptual capacities. Using chi-square test, the results showed that there is significant relationship between study habits and academic performance of the students. Osa-Edoh and Alutu (2012) also said that there exists relationship between students' study habits and their mathematics achievement. The study negates the result of the present study showing that there is a positive relationship between study habits and mathematics achievement and further indicates that as the students study habits improve their achievement also improves. The results also show that study habit contributes to students' achievement in mathematics.

Table 14. Relationship Between 21st Century learning Skills and the Mathematics Performance of the Respondents

21st century learning Skills	rho	p – value	Interpretation
Critical Thinking	0.090	0.307	Not Significant
Communication	0.197*	0.024	Significant
Collaboration	0.162	0.063	Not Significant
Creativity	0.254**	0.003	Significant

Legend: ** significant at 0.01 * significant at 0.05

The results disclosed that two of the learning skills are significant related to the mathematics performance of the learners. First, it is reported that communication skills and mathematics performance have a significant relationship as supported by the computed r=0.197 with p<0.05. This implies that learner with better communication skills and more fluent in expressing their ideas and opinion are performing higher in mathematics. Academic success depends on solid communication skills, beginning with clear oral communication. Students are often called upon in class to answer questions. These questions may range from those with simple factual answers to questions that involve putting thoughts together and making arguments. Answers to questions need to be communicated effectively so teachers can assess a student's knowledge.

Parallel with Asemanyi's (2015) study, the success of the students in the course depends greatly on the communication skill of students themselves. Lumibao, Luna and Namoco (2016) pointed out that challenging students to communicate both orally and in writing in mathematics class help deepen their conceptual understanding, and improve mathematics performance. It disclosed that mathematical communication is effective in improving students' achievement, and conceptual understanding. Jeon and Park (2014) also argued that communicating skills play a central role in the development of cognitive structures and that language is a means, not only for representing experience, but also for transformation of ideas. He asserted that improvement in language function produces improvement in certain kinds of problem-solving skills and that activation of language habits that the child has already mastered may improve performance as well.

In addition, student's creativity is a significant factor in the performance of student in mathematics. The computed correlation coefficient of 0.254 with $p<0.05$ shows that there is a significant relationship between creativity and performance of student in mathematics. The creativity and innovation as 21st century learning skills of the learners significantly contributed to the development of the mathematics competencies of learners. When students are equipped with creativity in dealing and working mathematics problems, it will lead them to the development of the necessary competencies in mathematics.

According to Idris (2006), considering creativity in mathematics education can provide guidance and help students to make sense of the surrounding by reasoning, thinking logically and connecting the ideas to discover the meaning of real-world. Lester (2013) pointed out that creativity in mathematical problem solving for all levels of educations should not be ignored during mathematics curriculum development. The efforts for creativity ought to be recognized since creativity encourages and enriches problem-solving. Education systems should focus less on the reproduction of information and more on creativity in problem-solving because students with a package of creativity, strong conceptual knowledge and good procedural competency would have a better opportunity to succeed in this global challenging era. How students consume and learn today are very different from past generations and what is needed by today's students might look very different in the future.

IV. CONCLUSIONS AND RECOMMENDATIONS

Based on the foregoing findings, the following conclusions were drawn:

1. Majority of the respondents are on the right age bracket for Grade 7 students and are dominated by females living in the rural area whose parents are degree holders who are in the other domain of occupation such as OFW, housekeepers, carpenters, drivers and in private sector. Most of the respondents spent 1-4 hours in using gadgets wherein smartphone is the most used gadgets and brainly is the commonly used apps by the respondents and they choose book as the number instructional materials at their home.
2. The respondents had a very good of study habits.
3. There is a high level of 21st century learning skills of the students.
4. There is very satisfactory performance of students in mathematics.
5. There is no significant relationship between demographic profile and study habits of the students.
6. There is no significant relationship between demographic profile and the level of 21st century learning skills of the students.
7. There is a high significant relationship between the study habits and 21st century learning skill of the students.
8. There is no significant relationship between study habits and performance of students in mathematics.
9. Communication and Creativity are significantly related to the mathematics performance of the students.

Based on the conclusions of the study, the following recommendations are forwarded.

1. Mathematics teachers shall utilize different applications in teaching mathematics concepts. Additional instructional materials shall also be provided in school to supplement the available instructional materials used by the students at home.
2. Teachers shall develop interactive instructional materials using online and offline applications that will enhance interest and improve study habits of the students.
3. Teachers shall develop or adopt learning plans that are aligned with the development of 21st - century learning skills of the learners.
4. Teachers shall sustain the very good performance of the students in mathematics through class collaboration, improved communication skills, creativity in teaching and learning and provision of challenging tasks that requires critical thinking of learners.
5. Future researchers shall conduct further studies using variables not included in the study to determine other profile variables that are significantly related to study habits.
6. Future researchers may also conduct further studies utilizing other statistical tools like regression to further determine the influence of profile variables to the 21st century learning skills of the students.
7. Students shall refine their study techniques and habits to enhance the 21st century learning skills of students.
8. Teachers shall implement interventions and remediation activities, and encourage learners to religiously work on their assigned task and activities.
9. Teachers shall use active learning through project based and problem based to enhance the communication and creativity and innovation of learners in mathematics.

REFERENCES

1) Apple - ACOT2 - Understanding of 21st Century Skills and Outcomes." Understanding of 21st Century Skills and Outcomes. Apple, 2008. Web. Retrieved on August 10, 2021. <http://ali.apple.com/acot2/skills/>.
2) P21 Framework Definitions." Partnership for 21st Century Skills, Dec. 2009. Web. August 10, 2021. <http://www.p21.org/documents/P21_Framework_Definitions.pdf>.
3) Aguila, MG. T. (2015). 21ST Century Skills of Nueva Vizcaya State University Bambang Campus, Philippines Nueva Vizcaya State University, Bambang, Nueva Vizcaya, Philippines. Asia Pacific Journal of Education, Arts and Sciences, Vol. 2 No. 2, April 2015
4) Agup, R. M. (2005) "Mathematical Skills and Physics Perfomance of Science and engineering Students of the University of Northern Philippines". Unpublished Master's Thesis, University of Northern Philippines, Vigan City.
5) Aigha, M., Majdi, W., Aljefri, H., Abdelfattah, M., Alagha, A., Elhameed, I.A. & El-derwi, D.A. (2017). Effects of parent's educational level and occupational status on child glycemic control. Journal of Patient Care, 3(2), 1-3. DOI: 10.4172 12573-4598.10000130
6) Amro, Hanan Jamal; Mundy, Marie-Anne; Kupczynski, Lori (2015).The Effects of Age and Gender on Student Achievement in Face-To-Face and Online College Algebra Classes. Research in Higher Education Journal, v27 Jan 2015
7) Ananiadou, K. and Claro, M. (2009). "21st Century Skills and Competences for New Millennium Learners in Oecd Countries". Working Paper No. 41. Retrieved on October 16, 2021 from https://goo.gl/3ehngF.
8) ATC21S. (2014). Framework for 21st century skills. Retrieved from http://www.atc21s.org/.
9) Balbalosa, J. (2010). "Factors Affecting Mathematics Performance of Laboratory High School Students at Laguna State Polytechnic University Academic Year 2009-2010". An Action Research, Laguna State Polytechnic University. Retrieved October 16, 2021 from www.aijcrnet.com/journals/Vol_2_No_6_June_2012/11.pdf.
10) Barcelona, M. P. (2017). " Development of Strategic Intervention Material in Mathematics for Grade 10 Students". Unpublished Master's Thesis, Ilocos Sur Polytechnic State College, Sta. Maria, Ilocos Sur
11) Jacob, S.M. (2012). Mathematical achievement and critical thinking skills in asynchronous discussion forums. Procedia - Social and Behavioral Sciences, 31 (2012), 800 – 804
12) Facione, P.A. (2011). Critical Thinking: What It Is and Why It Counts. Millbrae, CA: The California Academic Press
13) Rajendran, N.S. (2010). Teaching and Acquiring Higher Order Thinking Skills: Theory and Practice. Tanjong Malim, Perak: Penerbit Universiti Pendidikan Sultan Idris
14) Mujiasih, M., Waluyo, B., Kartono, K., & Mariani, S. (2021). The Students' Mathematics Communication Skill Performance After GeoGebra-Assisted EPIC-R Learning Implementation. International Journal of Learning, Teaching and Educational Research, 20(10).
15) Rohid, N., & Rusmawati, R. D. (2019). Students' Mathematical Communication Skills (MCS) in Solving Mathematics Problems: A Case in Indonesian Context. Anatolian Journal of Education, 4(2), 19-30.
16) Tinungki, G. M. (2015). The Role of Cooperative Learning Type Team Assisted Individualization to Improve the Students' Mathematics Communication Ability in the Subject of Probability Theory. Journal of Education and Practice, 6(32), 27-31.
17) Hossain, M. A., Tarmizi, R. A., & Ayub, A. F. M. (2012). Collaborative and cooperative learning in Malaysian mathematics education. Journal on Mathematics Education, 3(2), 103-114.
18) Sahin, M. C. (2009). Instructional design principles for 21st century learning skills. Procedia-Social and Behavioral Sciences, 1(1), 1464-1468.
19) Belecina, R. R., & Ocampo Jr, J. M. (2018). Effecting change on students' critical thinking in problem solving. Educare, 10(2). Retrieved on June 21, 2022 from https://bit.ly/2VLP3Gf
20) Binkley, M., Erstad, O., Herman, J., Raizen, S., Ripley, M., & Rumble, M. (2010). Defining 21st century skills. Assessment and teaching of 21st century skills draft white paper. The University of Melbourne
21) Biswas, S. K. (2015). Study orientation of high and low achievers at secondary level. International Journal on New Trends in Education & their Implications (IJONTE), 6(4). https://doi.org/10.14738/assrj.210.1355
22) Blömeke, S., & Delaney, S. (2014). Assessment of teacher knowledge across countries: A review of the state of research. International perspectives on teacher knowledge, beliefs, and opportunities to learn (pp. 541- 585). Springer, Dordrecht. https://doi.org/10.1007/978-94-007-6437-8_25
23) Brown, L. I., & Kanyongo, G. Y. (2010). Gender differences in performance in mathematics in Trinidad and Tobago: Examining affective factors. International Electronic Journal of Mathematics Education, 5, 113–130. [Google Scholar].
24) Brunner, Krauss, & Kunter (2007). Gender differences in mathematics: Does the story need to be rewritten?Intelligence 36(5):403-421DOI:10.1016/j.intell.2007.11.002

25) Cajindos, R. P. (2009). "Analysis of the Performance in Trigonometry of the First Year College Students of Divine Word College of Vigan. Retrieved on October 16, 2021 from https://goo.gl/V6PtDg.
26) Campbell, J., Hombo, C., & Mazzeo, J. (1999). NAEP 1999 trends in academic progress: Three decades of student performance. Education Statistics Quarterly, 2, 4.
27) Care, E., Azim, F., Beswick, B., Harding, S. M., Luo, R., Bustos, T., & Cagasan, L. (2015). Large-scale assessments for use in the Philippines. Retrieved on November 25, 2021 from http://bit.ly/2G0PvYq
28) CEO (2001). 21st Century Skills and eLearning by Joanna Baniaga. URL: gallery of writing.Org/uploads_ converted/ KEY_1883901/1883901.pdf retrieved November 25, 2021
29) Cornell, D., & Grossberg, I. (1987). Family environment and personality adjustment in gifted program children. Gifted Child Quarterly, 31(2), 59-64.
30) Crosnoe, R., Johnson, M.K., & Elder, G.H. (2004). School size and the interpersonal side of Education: An examination of race/ ethnicity and organization context. Social Science Quality, 85(5), 1259-1274
31) Del Castillo, H. P. (2010). " Factors Affecting Mathematics Performance of Grade III Pupils in Bantay District". Unpublished Master's Thesis, Ilocos Sur Polytechnic State College, Sta. Maria, Ilocos Sur.
32) Dinglasan, B. L., & Patena, A. (2013). Students performance on departmental examination: Basis for math intervention program. University of Alberta School of Business Research Paper, (2013-1308). Retrieved on November 25, 2021 from http://bit.ly/2uYhfrk
33) Duncan, Arne.(2011) "An Open Letter from Arne Duncan to America's Teachers." U.S. Department of Education. U.S. Department of Education. Retrieved on August 10, 2021 from https://bit.ly/2YH4sJI
34) Eccles, J. (2011). Gendered education and occupational choices: Applying Eccles et al. model of achievement-related choices. International Journal of Behavioural Development, 35, 195–201. doi:10.1177/0165025411398185 [Crossref], [Web of Science ®], [Google Scholar]
35) Ekpo, T.E. & Ajake, U. E. (2013). Family socio-economic status and delinquency among senior secondary school's students in calabar state, cross river state, Nigeria. American International Journal of Contemporary Research, 3(4), 83-88. URL:
36) Eraikhuemen, L. (2003). The influence of Gender and School location on Students' academic Achievement in Senior Secondary School Mathematics. ife Journal of Theory and Research in Education. 7(2), 99-112.
37) Etcuban, J. O., & Pantinople, L. D. (2018). The effects of mobile application in teaching high school mathematics. International Electronic Journal of Mathematics Education, 13(3), 249-259. https://doi.org/10.12973/iejme/3906
38) Gabriel, E. D. (2012). "Determinants of the Mathematics Performance of the Fourth Year High School Students of Sta. Lucia District". A Master's Thesis, Ilocos Sur Polytechnic State College – Tagudin Campus.
39) Gabriel, M. N., Muli, N.L., Muasya, I., Moanga, L. & Mukhungulu, M. (2016). Parents socioeconomic status and student's achievement in selected secondary schools in urban informal settlements in westlands divisions, Nairobi country. International Journal of Education and Social Science, 3(1), 43-53. URL: https://www.researchgate.net/publication/333105438_Parental_socio_economic_status_academic_achievement_in_selected_secondary_schools_in_urban_informal_settlements_in_Westlands_Division_Nairobi_county.
40) Ganal, N. N., & Guiab, M. R. (2014). Problems and difficulties encountered by students towards mastering learning competencies in mathematics. Researchers World, 5(4), 25. Retrieved from http://bit.ly/2X0dJc8
41) Gherasim, L. R., Butnaru, S., & Mairean, C. (2013). Classroom environment, achievement goals and maths performance: gender differences. Educational Studies, 39, 1–12. doi: 10.1080/03055698.2012.663480
42) Gloria, C. G. (2015). "Mathematical Competence and Performance in Geometry of High School Students". International Journal of Science and Technology. Volume 5, No. 2. Retrieved on October 16, 2021 from http://www.ejournalofsciences.org.
43) Griffin, P., & Care, E. (2014). Test Construction. In P. Griffin (Ed.), Assessment for Teaching (pp. 156-173). Cambridge: Cambridge University Press.
44) Grissmer, R. H. 2003. Beyond Helping with Homework: Parents and Children Doing Mathematics at Home. Teaching Children Mathematics, 14, 120 – 131.
45) Gualda, R.C., Chillon, P., Ruiz, Jonathan, R. & Pavon, D.J. (2011). Associations between parental educational/occupational levels and cognitive performance in spanish adolescents. The Avena Study. 23(3). URL:file:///C:/Users/carlos%20pc%207/Downloads/Associations_between_parental_educationaloccup atio.pdf
46) Khan, R. M. (2015) " The influence of Parents Educational Level on Secondary School Students Academic Achievements in District Rajanpur."

47) Leatham, K. R., & Peterson, B. E. (2010). Secondary mathematics cooperating teachers' perceptions of the purpose of student teaching. Journal of Mathematics Teacher Education, 13(2), 99-119. https://doi.org/10.1007/s10857-009-9125-0
48) Leones, G. V. (2018). " Chemistry Process Skills and Achievement of the Grade 9 Students of Santa Maria National High School". Unpublished Master's Thesis, Ilocos Sur Polytechnic State College, Sta. Maria, Ilocos Sur.
49) Levy, F., & Murnane, R. J. (2004). The new division of labor: How computers are creating the next job market. Princetown, NJ: Princetown University Press.
50) Lindberg, S. M., Hyde, J. S., Petersen, J. L., & Linn, M. C. (2010). New trends in gender and performance in mathematics: A meta-analysis. Psychological Bulletin, 136, 1123–1135. doi: 10.1037/a0021276 [Crossref], [PubMed], [Web of Science ®], [Google Scholar]
51) Lombardi, M. M. (2009). Authentic learning for the 21st century: An overview. Educause Learning Initiative, 23(1), 240-241. Retrieved from: http://net.educause.edu/ir/library/pdf/ELI3009.pdf
52) Mathis, W.J., Research-Based Options for Education Policymaking – 2013 Collection. Retrieved on August 10, 2021 from https://nepc.colorado.edu/publication/options.
53) Memon, G.R., Joubish, M.F. & Khurram, M.S. (2010). Impact of parental socio-economic status on student's educational achievement at secondary schools on students malir, Karachi. Middle-East Journal of Scientific Research, 6(6), 678-687. URL: https://pdfs.semanticscholar.org/f00d/a1f50600e59858cf90f6d80758149f7d66d8.pdf
54) Meresen, M. M. (2010). " Classroom Learning Environment, Attitudes and Achievement of Studies in Chemistry". Unpublished Master's Thesis, University of Northern Philippines, Vigan City.
55) Murnane, R.J., Levy F., Teaching the New Basic Skills: Principles for Educating Children to Thrive in a Changing Economy Retrieved on August 10, 2021 from https://www.amazon. com/Teaching-New-Basic-Skills-Principles/dp/0684827395
56) Musgrave, C.B. 2000. Environmental Factors Affecting Attitude towards Science and Mathematics. Journal of Educational Psychology, 91(1) 382 – 394.
57) Nagy, G., Watt, H. M., Eccles, J. S., Trautwein, U., Lüdtke, O., & Baumert, J. (2010). The development of students' mathematics self-concept in relation to gender: Different countries, different trajectories?. Journal of Research on Adolescence, 20(2), 482-506. https://doi.org/10.1111/j.1532-7795.2010.00644.
58) O' Suvillan, R. H. et al. (2014).Parental Mathematics Homework Involvement of Low – Income Families with Middle School Students. School Community Journal, 2014, Vol. 24, No. 2.
59) Odoh, L.C., Ugwuanyi, U.B., Odigbo, B. & Chukwuani, N.V. (2017). Influence of parental occupation and level of education on academic performance of accounting students in nigeria. Research on Humanities and Social Science, 7(10). URL: file:///C:/Users/carlos%20pc%207/Downloads/JournalarticleonParentaleffectonperformance.pdf
60) Omalde, A., Kassim, A. & Modupe, S. (2014). Relative effects of parent's occupation, qualification and academic motivation of wards on student's achievements in senior secondary mathematics in ogon state. Journal of Education and Practice, 5(22). URL: https://pdfs.semanticscholar.org/865b/11bdc80073138d07276b94268f32b3c99989.pdf
61) Omayana, G. (2019). The Utilization of the Four C's to the Enhancement of English Proficiency (Unpublished Masters Thesis). Butuan City, Philippines.
62) Brenton, L. (2019) Top 10 Ways to Increase Your Students' Interest in a Subject. Retrieved from https://www.emergingedtech.com/2016/04/10-ways-to-increase-students-interest-in-a-subject/ on May 12, 2022
63) Odiri, O. E. (2015). Relationship of Study Habits with Mathematics Achievement. Journal of Education and Practice, 6(10), 168-170.
64) Asemanyi, A. A. (2015). An Assessment of Students' Performance in Communication Skills: A Case Study of the University of Education Winneba. Journal of Education and Practice, 6(35), 1-7.
65) Lomibao, L. S., Luna, C. A., & Namoco, R. A. (2016). The influence of mathematical communication on students' mathematics performance and anxiety. American Journal of Educational Research, 4(5), 378-382.
66) Jeon, S., & Park, J. H. (2014). Analysis of relationships of scientific communication skills, science process skills, logical thinking skills, and academic achievement level of elementary school students. Journal of the Korean Association for Science Education, 34(7), 647-655.
67) Idris, N. (2006). Creativity in the teaching and learning of mathematics: Issues and prospects. Masalah Pendidikan, 29, 103-114.
68) Lester Jr, F. K. (2013). Thoughts about research on mathematical problem-solving instruction. The mathematics enthusiast, 10(1), 245-278.

69) Molano, T. C., Cammayo, R. P., Dioses, G. M., & Dioses Jr, J. L. (2020). The Comparative Analysis of Self-Assessment of Pre-Service Physical Science Teachers on the Extent of Their Acquisition of the 21st Century Skills in Selected Regions in The Philippines. International Journal of Scientific and Technology Research, 9(2), 865-867.
70) Karbalaei, A. (2012). Critical thinking and academic achievement. Íkala, revista de lenguaje y cultura, 17(2), 121-128.
71) Bulgurcuoglu, A. N. (2016). Relationship between critical thinking levels and attitudes towards reading habits among pre-service physical education teachers. Educational Research and Reviews, 11(8), 708-712.
72) Gallardo-Echenique, E., Bullen, M. & Marqus-Molas, L. (2016). Student communication and study habits of first-year university students in the digital era. Canadian Journal of Learning and Technology, 42(1).
73) Online Sources
74) K to 12 Mathematics Curriculum Guide. (2013). Retrieved on June 2022 from https://goo.gl/PnZbjR.
75) Paige, J. (2009). The 21st Century Skills Movement. Educational Leadership, 67, 11.
76) Paul, R., & Elder, L. (2019). The miniature guide to critical thinking concepts and tools. Rowman & Littlefield. Retrieved on August 10, 2021 from https://bit.ly/31AEnh0
77) Robinson, J. P., & Lubienski, S. T. (2011). The development of gender achievement gaps in mathematics and reading during elementary and middle school: Examining direct cognitive assessments and teacher ratings. American Educational Research Journal, 48, 268–302. doi: 10.3102/0002831210372249 [Crossref], [Web of Science ®], [Google Scholar]
78) Seefeldt, C. (2004). Helping Children Communicate. Early Childhood Today, 19(1), 36-42. Retrieved on August 10, 2021 from https://bit.ly/3if1Avd
79) Siemens, G. (2004). A learning theory for the digital age. Retrieved on October 3, 2021 from http://www.elearnspace.org/articles/connectivism.htm
80) Taiwo, H.G. 1993. Family Environment and Educational Attainment of Some School Children in Western Nigeria. Journal of the Science Teachers Association of Nigeria, 46(2), 107-116.
81) Thompson, M., Alexander, K., & Entwisle, D. (1988) Household composition, parental expectations, and school achievement. Social Forces, 67, 424-451.
82) Trilling, B., & Fadel, C. (2009). 21st century skills: Learning for life in our times. John Wiley & Sons. Retrieved on August 10, 2021 from https://bit.ly/3gaelVZ
83) Tully, D., & Jacobs, B. (2010). Effects of single-gender mathematics classrooms on self-perception of mathematical ability and post-secondary engineering paths: An Australian case study. European Journal of Engineering Education, 35(4), 455-467. https://doi.org/10.25115/psye.v9i1.465