PROJECT PANUKIDUKI: JOURNEY OF YOUNG SCIENTISTS IN THE CONDUCT OF SCIENCE INVESTIGATORY PROJECTS

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Completed 2020

ABSTRACT

Science teachers embed the teaching of the Science Investigatory Projects content in the curriculum, which helps the students conduct original work, understand the problematic and contentious nature of science, and immerse in hands-on and minds-on tasks. With this, the study aimed to describe the experiences, coping mechanisms, and insights of the students who are conducting Science Investigatory Projects which answered the three fundamental questions. The study utilized the phenomenological approach, wherein two (2) data collection techniques, the In-depth Interview and Focus Group Discussion were employed. Fourteen (14) STEM strand students from Montevista National High School-Main Campus participated in the investigation. Essential themes were generated out from their responses to the research questions. The results uncovered the participants' lived experiences, and from it seven (7) themes emerged: demand for resources, difficulties with internet access, enjoyable activities, applicability to daily life, independence in performing tasks, development of skills, solve problems in various ways. The participants also shared their coping mechanisms in dealing with the challenges they encountered, from which emerged two (2) themes: motivating oneself and being resourceful. Lastly, for the insights they cited, four (4) themes emerged: consistent engagement, support from the parents and the school, training for students and teachers, and promote the benefits of research among students. Moreover, results of this study were useful to the Department of Education (DepEd) in its implementation on the appropriate plans and programs specifically in intensifying the scientific research culture in schools.

Keywords: *Project Panukiduki, Young Scientists, Science Investigatory Projects*

ACKNOWLEDGEMENT

The researchers would like to express their sincere gratitude to the following people who made this research study a success.

Above all to the **ALMIGHTY GOD**, the source of all wisdom and knowledge, guidance and blessings that help the researcher to face all challenges.

Eufemia T. Gamutin, CESO V, Schools Division Superintendent, for her untiring support towards the realizations of this research.

Maam Annalyn M. Loreto, OIC, SEPS - Planning and Research, for her time, patience, professional guidance, and productive comments throughout our research journey.

The Schools Division Research Committee (SDRC) chaired by **Dr. Rommel R. Jandayan**- Assistant Schools Division Superintendent and his members for their productive comments and suggestions for the improvement of this research.

The **Montevista National High School** family headed by **Dr. Gernaldine O. Perez** and **Maam Marites V. Villacorteza**, for all out support in the realizations of this research endeavor.

Their **respective families**, for their unconditional love, moral, financial and emotional support. Special appreciations are also extended to those who contributed and shared their support especially to research informants and participants, for sharing their precious time and 2020 DRTWG, for the technical assistance during the conduct of research clinic.

-The Researchers

Chapter 1
INTRODUCTION

The advancement of science is essential to global progress. In fact, scientific study has produced important concepts, hypotheses, and guiding principles that are necessary for today's technology. This importance is demonstrated, for example, by how knowledge and the scientific method are applied to advance priority and advanced fields (DiChristina, 2014).

There are many difficulties facing scientific educators in the early 21st century. Additionally, according to the National Center for Education Statistics from 2007, American students continue to do worse than pupils in other countries, particularly those in Europe and Asia, when it comes to science achievement. The availability of appropriate textbooks and instructional materials, the preparation and training of science teachers (including both pre-service training and in-service professional development), the opposition of political and religious groups to innovative science instruction, the need to meet standards and get students ready for standardized exams, and the dramatically rising use of the internet as a learning tool are just a few of the complex issues in the field of science education. In light of these and other challenges, it is essential to know, recognize, and develop adolescent learners' abilities while also tailoring instruction to suit the specific challenges that this age group encounters.

Republic Act 2067 (Science Act of 1958) states that scientific research is fostered and promoted across the country as a potent weapon for advancing S&T, R&D, and innovation for the good of the whole nation. According to the Philippine Development Plan

2017–2022, the current administration is supporting the law through fostering S&T and innovation across the country. The six-year development plan emphasizes science R&D productivity and innovation as the cornerstone of a globally competitive knowledge economy to hasten the adoption of new technologies and foster creativity across all economic sectors (NEDA, 2017).

A basic education is also a must for the nation's science research goals. The fundamental education research agenda (DO No. 39, s. 2016) of the Department of Education combines the national research goals, particularly the T&L agenda. Science studies can therefore be used into T&L to create teaching materials, community contextualization, and performance-based evaluations. Elementary and high school students can do scientific research through science investigatory projects (SIPs), which are part of the latter two in the basic education curriculum. In accordance with Autiere et al. (2016), these projects give students the opportunity to connect with the outside world and address problems in their communities.

In addition, SIPs encourage students to be inquisitive, apply knowledge and skills, and recognize the social implications of science, as reported by DOST-Science Education Institute (SEI) and University of the Philippines National Institute of Science and Mathematics Education (2011), which claim that this helps students become scientifically literate. Additionally, SIPs can "provide effective medium in the development of S&T consciousness among the youth, promote public understanding and appreciation of scientific breakthroughs, and improve the quality of S&T in the country," according to DOST-SEI (DOST-SEI & UPNISMED, 2011). As they discover the answer to their

inquiries through the use of SIPs, students receive instruction in problem-solving, critical thinking, and creative thinking.

Despite this, a number of regional and local concerns continue to plague the Philippines, such as the escalating rivalry brought on by globalization and regional integration (The National Academy of Science and Technology Philippines, 2016).

Montevista National High School science instructors incorporate the teaching of SIP content into the STEM (Science, Technology, Engineering, Mathematics) curriculum to assist students in conducting original research, understanding the contentious and problematic nature of science, and participating in hands-on, mind-on activities (DOST-SEI & UP-NISMED, 2011; Cuartero, 2016).

However, due to their inexperience and lack of scientific research expertise, both the students and the teachers still struggle to carry out this objective. Due to this, on August 14, 2019, the Science Department launched an intervention program to step up the completion of science investigative projects. Our School Principal and the Principal of the Senior High School fully supported this initiative. The Science Department had the honor of inviting an external expert, a Chinese international instructor for biology and chemistry. She then served as one of the judges for the esteemed INTEL - ISEF International Competition for Science Investigatory Projects. The path taken by the children to participate in SIP-making and scientific fairs has not been addressed in the local environment, despite the fact that it is one of the current issues in science inquiry for both teachers and students. Therefore, when students conduct science investigative projects, it is imperative that their experiences and narratives be taken into account. The poll was

conducted because the paper intended to learn about students' experiences and challenges with fostering a culture of scientific inquiry in foundational education.

Literature Review

This part provides topics and literature pertinent to the current subject under study in order to provide the reader with a thorough comprehension of the notion of the problems and obstacles faced by the students in carrying out science investigatory projects. Findings from related studies were given in order to give us a better understanding of what this qualitative investigation is emphasizing. They were gathered from a range of publications, including books, periodicals, websites, and other reading materials.

Science Investigatory Projects

According to the projects' content, SIPs are seen as vehicles through which students can aid in the advancement of S&T in the nation. These initiatives advance S&T, advance the community, and contribute to the creation of new knowledge as well as the creation of existing knowledge that has socioeconomic importance for the development of livelihoods. As a result, students are better able to do creative work, comprehend the disputed and problematic nature of science, and participate in hands-on, mind-on activities (DOST-SEI & UP-NISMED, 2011; Cuartero, 2016). Science teachers include the teaching of SIP material into the curriculum.

Demand for Resources

Al-Qaderi (2016) found that resources are necessary to achieve an output when examining the difficulties experienced by undergraduate students when attempting research projects. SIP, like any other endeavor, requires funds/budget in order to pay for

laboratory tests and hire facilities. Controlled experiments necessitate the use of equipment, tools, and facilities, as SIP follows standard methods and protocols. Research necessitates the availability of resources such as cash and facilities. There were occasions when students needed to repeat experiments and conduct pre-trial investigations, which necessitated the use of cash and resources. In this situation, the project has become excessively complex.

Difficulties with Internet Access

Gong (2009) asserts that during the past few years, the internet has significantly grown and integrated itself into people's social, commercial, educational, political, and personal activities on a global scale as a primary medium for information transmission. Despite the fact that the internet has many benefits for its users, users frequently experience a variety of network issues when accessing it from different locations, including connection drops, unpredictable performance, and commutes that take a long time to refresh, fail to load, and experience session failures.

Enjoyable Activities

High expectations for each student's performance, an individualized learning environment, instruction that challenges learners' perspectives, opportunities for significant student involvement and engagement during instruction, self-efficacy, and other elements have all been linked to improved achievement in high school research courses (Wang, 2013).

Applicability to Daily Life

According to Schuck and Grootenboer (2004), studies on how students view their own learning have recently attracted a lot of attention. Notably, it was assumed that students' motivation to learn how to solve problems was influenced by their beliefs in their capacity

to complete time-consuming mathematical problems, the value of developing their research skills, and the usefulness of application in daily life (Mason, 2003).

Independence in Performing Tasks

The results of a study provide credence to the idea that high school students seek intellectual challenge. A Philadelphia urban school's more than fifty pupils were interviewed by researchers, who discovered that kids desire to be personally challenged in their academic work and feel that teachers who do not intellectually challenge them are not doing their jobs properly (Wilson & Corbett, 2001). Students want to be in control of their education because it will motivate them to work harder to solve difficulties and problems that interest them.

Development of Skills

In general, new students arrive with fewer skills than prior generations. Students today are more technologically savvy than prior generations (Noeth & Volkov, 2004). There's even evidence that today's pupils are more enthusiastic about research than past generations (Senk & Thompson, 2003).

SIPs help students increase their scientific curiosity, apply knowledge and skills, and comprehend how science affects society, according to DOST-Science Education Institute (SEI) and the University of the Philippines National Institute of Science and Mathematics Education (2011).

Solve Problems in Various Ways

Wilson and Corbett (2007) found that students' desired professors who set high expectations for their performance, offered extra assistance, explained concepts until everyone understood them, and could manage disruptive students without losing focus

of the subject. In other words, they desired to be challenged academically. According to the researchers, the pupils they examined over a three-year period consistently identified these features. They contend that due to this consistency, students' expectations of instructors are learning-centered.

Moreover, SIPs can also help to “develop S&T consciousness among the youth, enhance public understanding and appreciation of scientific advances, and improve the quality of S&T in the country,” according to DOST-SEI. Students are taught to be problem-solvers, critical thinkers, and creative thinkers as they use SIPs to attempt to unravel the mysteries of their investigations (DOST-SEI & UPNISMED, 2011).

Motivating Oneself

It has been demonstrated that optimism can strengthen the immune system, fend off chronic disease, and speed up the recovery of those who have received unfavorable news. According to studies, persons who feel grateful are happier, receive more social support, are less stressed, and experience less sadness. Being grateful has also been linked to optimism. Current research on how people tackle events shows that optimists and pessimists have different capacities for overcoming hardship (Shukla, 2018).

Understanding how to deal with stress and impulse control are two aspects of stress management. The ability to endure unpleasant situations and challenging conditions while actively and proactively overcoming the stress is known as how to handle stress. The ability to remain calm and patient under pressure is connected with resilience under stress. Impulse control is the ability to resist and put off acting on urges and temptations. We must not overlook the important role that mood plays in emotional intelligence (Hassan & Baba, 2008).

Being Resourceful

Previous research, on the other hand, has discovered that a child's resourcefulness is highly related to their gender, age, and optimistic beliefs. Another set of research found that a child's personality qualities may predict whether they will grow up to be a very resourceful adult. These qualities include being able to quickly absorb ideas and concepts, being able to recognize patterns, having a preference for accuracy, having strong observational skills, and enjoying a range of activities, such as thinking about challenging concepts (Cheang, 2018). Other investigations have discovered that children who incline toward positive thinking rather than negative thinking are more likely to become resourceful and to use the right kinds of coping mechanisms (Zauszniewski et al., 2008).

Consistent Engagement

According to Crone (2008), students who participate in active learning environments may develop stronger critical thinking skills and become less passive. Garside (2006) listed the qualities of critical thinking as being clear, precise, accurate, relevant, logical, and consistent thinking; thinking that reflects a controlled sense of skepticism or disbelief of any assertion, claim, or conclusion until sufficient evidence and reasoning are provided to conclusively support it; and thinking that evaluates the strengths and weaknesses of the information that is already available.

The ability to think critically, as described above, is essential for students to develop because it will benefit them in both their academic and professional careers, regardless of their field of study (Dancer, 2005). Despite the fact that participation has numerous advantages supported by the available research, only a tiny portion of students engage in it and little class time is dedicated to it (Fritschner, 2000).

Support from the parents and the school

There are many prospects for success when parents are involved in their kids' education. Parental involvement in their children's education enhances a child's motivation, attitude, and academic achievement in all subject areas as well as their behavior and capacity for social adjustment, according to the Centre for Child Well-Being (2010). It goes on to stress the value of parents being involved in their children's education so they can grow up to be responsible, successful adults. This suggests that integrating parents in their children's education is the same as the school taking the initiative to adopt modifications or advancements. Increased parental involvement increases the likelihood that teachers and school administrators will carry out successful educational change. A fresh body of evidence: Mapp K.'s The Effects of School, Family, and Community Connections on Student Achievement. Additionally, Henderson (2002) states that "most kids at all levels—elementary, middle, and high school—want their families to be more knowledgeable partners about learning and are willing to take active roles in schooling."

According to the study, "When parents come to school on a regular basis, it supports the child's perception that school and home are linked and that school is an important part of the whole family's life." (Clinton & Hattie, 2013). In general, parents' involvement in their children's educational process offers many opportunities for success.

Children's education is greatly impacted by parent-teacher partnership. Llamas and Tuazon (2016) found that parents feel more at ease when the educational system requires them to take part in school activities. When parents and school officials work closely together, the school's academic and athletic performance can be improved. To

encourage parents to participate actively in and support the institution's mission and goals, school administrators must inspire those (Sapungan & Sapungan, 2014).

Trainings for Students and Teachers

Due to their efficacy in including students in the teaching and learning process, seminars have been employed as a teaching approach ever since Socrates. Instead of giving straight instructions, Socrates asked questions and posed scenarios that required students to engage higher order thinking skills to comprehend the underlying meaning of his comments (Bates, 2016).

By incorporating their experience, identity, and beliefs into the teaching and learning process, students are seen as participants in the creation of reality and the pursuit of truth (Dewey's principles, cited in Bates, 2016). Dewey's Principles state that teachers shouldn't lecture to their pupils but rather offer opportunities for discussion, the formation of new knowledge, and the reflection of that knowledge with the help of facilitators and guides, which promotes students' active participation (Weber, Gabbert, & Patrick, 2007).

Seminars also assist in the development of critical reading and writing skills by requiring participants to read and write critically as well as examine a variety of sources and synthesize facts relevant to the seminar's goal (Playmouth, 2011). Additionally, they give researchers, teachers, and students a platform where they may discuss their research and often receive feedback from the audience. As a result, it promotes an intellectual environment at work or school and broadens participants' comprehension of other people's research findings while ensuring that participants are updated on debate-related current events (Illinois, 2015). Therefore, organizing and participating in seminars

helps to enhance managing, presenting, and communication abilities. For people who detest reading, it is also a terrific method of learning, claim Chaman and Wells (2012).

Promote the benefits of research among students

According to studies, when students were exposed to project- and issue-based assignments like SIPs, their self-efficacy increased, and they gained 21st century abilities including teamwork, problem solving, and critical thinking (Gomez, 2013).

Science investigatory projects (SIPs) give students practical experience in the scientific method as they conduct research and exploration in a particular field of study. SIPs are an effective way to advance knowledge, have a positive effect on society, and invent new items for the good of all humankind (Lebednik, 2016). Science research highlights the importance of livelihood, environmental conservation, and sustainable progress because it aids in the growth of Science and Technology. Therefore, SIP assists students in developing their abilities to solve problems, think critically, and use creativity by immersing learners in problem-based assignments, authentic learning activities, and inquiry-based studies. As a result, children can use their curiosity to generate questions, hypotheses, experiments, and suggestions for reality-checking (Nahadi & Sriyati, 2017).

The Purpose of the Study

The goal of this empirical research was to describe the perceptions, coping mechanisms, and experiences of the Montevista National High School STEM students who engaged on scientific research projects. Students who took part in a program at Montevista National High School that encouraged them to perform science-related research projects served as the study's informants. Interviews were conducted with them

to learn about their perspectives on the difficulties they faced putting the intervention program into action and how it affected their ability to conduct research. The study also aimed to provide the science department, the school, the stakeholders, and the concerned government agencies with the knowledge gained from this research that suggests the need to intensify the research culture and provide policies that will empower students, strengthen their value as future innovators, and provide them with the best methods for their spiritual, moral, emotional, and skill recovery, supporting them towards viable careers. The main purpose of this study was to describe, analyze, and document the students' experiences, coping mechanisms, and insights as they worked on science inquiry projects.

Research Questions

The research provided answers to the three key issues. Each of these was then divided into narrower questions to aid in the data gathering and analysis procedures. As a result, the following significant concerns were resolved:

1. What science investigatory project experiences have the students had in the context of the school's existing research culture?
2. How do the students handle the difficulties involved in completing science investigative projects in the context of the school's existing research culture?
3. What are the insights of the students in conducting Science Investigatory Projects in the current research culture of the school?

Theory-Based Lens

The fundamental tenet of constructivism, according to Bruner's (1990) theory of ideas, is that every learner must actively construct their own knowledge and skills. So,

regardless of whether there is an objective reality or not, each person creates their own reality via experience and contact with the outside world. In order to make meaning of new information as it is experienced, a person filters it through mental frameworks (called schema) that include prior information, beliefs, and preconceptions (Prince & Felder, 2006). The concept of learning has a long history, but more recent research on it by John Dewey (1933), Jerome Bruner (1990), and Lev Vygotsky (1978), as well as Jean Piaget's (1972) work on developmental psychology, has given rise to the constructivism movement's inclusive stance. Cognitive constructivism and social constructivism are its two basic subtypes. The majority of cognitive constructivism is based on Piaget's (1972) theory of cognitive development, which proposed that knowledge must be created by the learner and that experience is the primary way in which knowledge is learned. Learning results from these encounters because they enable the development of schemas or mental models. The social environment of learning is more important to social constructivists than it is to cognitive constructivists. Social constructivism's main proponent, Vygotsky, proposed that language, social context, and cultural history all have a significant impact on how quickly and how pattern-wise children develop. According to Vygotsky's theory of the zone of proximal development, people can understand concepts and ideas that they are unable to comprehend on their own with the help of a more knowledgeable peer (Vygotsky, 1978).

Relevance of the Study

On general, like the other research outputs, this one sought to provide information for a greater comprehension of the various problems and challenges encountered by the students when carrying out science investigatory projects. By gathering a thorough

documentation of their research experiences and learning more about their sources of strength, versatility, techniques, and mechanisms.

The findings of this study will give the Department of Education (DepEd), in particular, clear historical context so that it can establish the appropriate policies and programs for fostering a research culture in schools. The School Heads and their employees, the teachers, can utilize this to look at the actual situation of students working on science investigation projects in order to change the plans and programs. This serves as a link for the students who are having problems finishing their study so that these issues can be heard and understood. This story will inspire other students who are apprehensive about doing research.

Term Definitions

The following concepts were operationally defined here to provide a deeper understanding of some of the terms used in this study.

Project Panukiduki. It is an intervention strategy used to improve how scientific research projects are carried out at Montevista National High School.

Young Scientists. The students who are conducting science investigatory projects under the program of Project Panukiduki.

Science Investigatory Projects. The aforementioned school is performing scientific research as part of its Science, Technology, Engineering, and Mathematics curriculum. In order to gather the students' experiences and challenges with conducting science research projects both within and outside of the classroom, this underwent an intervention program.

Scope and Limitations

The study was carried out at the intended participants' location, Main Campus of Montevista National High School in Montevista, Davao de Oro. The statements and testimonies of the students who took part in the intervention program of carrying out science research projects were detailed and documented in this research. The focus of this was narrowed and limited to investigating how students dealt with performing science investigation projects, as well as how they coped and what insights they shared with their classmates, peers, and the institution as a whole. The small sample size of the informants was a factor that acted as restrictions or a perceived weakness of this study and may have prevented it from having the desired generalizability. The researchers cannot guarantee that the small sample of participants in the study accurately reflected the total number of claims of having reached the correct conclusions. The difficulty in determining the degree of accuracy of those memories, which have occurred at the same period in the participants' lives, was another disadvantage of this study.

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METHODS OF RESEARCH

The research study's qualitative technique was covered in this chapter. This comprises the study's design, the researchers' responsibilities, the study's participants, the procedures used to collect and handle the data, and the reliability, validity, and moral propriety of the study.

Research Approach

A qualitative descriptive phenomenological approach was adopted in the study. The investigation involved Senior High School STEM students. To clarify, a descriptive phenomenology study is a method for looking into and cataloging people's experiences. Husserl's phenomenology is based on the lived experience of humans, and as such, it attempted to revive the human world as a scientific foundation that did justice to the everyday lived experience—getting to the things themselves. The rich and complex source of unspoken meaning associated with being and experiencing also shapes how a person sees the world (Christensen et al., 2017).

Researchers used two methods for gathering data: in-depth interviews and focus groups. In these methods, information was frequently gleaned through the use of techniques like one-on-one interviewing, reading and interpreting written responses, and/or documenting and observing community targets. Since individual experience, perspectives, and sentiments about a variety of issues of interest can only be obtained through an informal dialogue with the kid informants, qualitative procedures, such as in-depth interviews, are best. As a result, they are especially well suited for delicate subjects

like dangerous experiences. Focus groups, on the other hand, are most effective when you want to consider not just the accounts or realities that children themselves have, but also the ways in which they negotiate these accounts with others, so displaying divergence or convergence between their opinions (Livingstone & Haddon, 2007).

The Role of the Researchers

The researchers' contribution to this qualitative research study was viewed as being crucial to achieving the objective of a successful examination of any societal phenomenon. The researchers' goal in conducting this survey was to learn what students thought about how science and technology education has changed. The researchers and interviewers who were in charge of meeting the participants offered them a series of open-ended questions, providing them the chance to answer with particular information and thoughtful observations. In addition, the researchers had some skills and traits for writing effectively, used pertinent questions and follow-up inquiries to elicit detailed responses and elaborations of the informants' occurrences, coping techniques, and insights of students struggling with their science investigation projects.

Concerning the role of the researchers, this study was intended for those persons responsible and willing to commit themselves to the extensive time, and varied settings in crafting information, gathering data, and transcribing long passages shared to them by their participants and up to presenting their research. Hence, the researchers also occupied several roles in the said study, as interviewers, recorders, translators, analysts, and encoders. In order to learn more about the issues at hand, the researchers used rapport-building techniques during the interviews, building strong friendships and

attachment relationships with the participants. The researchers used some strategies, such as probing questions, recording the full interview, and taking notes, during the course of the interview and observation. Additionally, the focus group discussions and in-depth interviews that were conducted as part of the aforementioned data gathering methodologies were all recorded by the researchers.

Sampling

This section provided a description of the participants and used criteria to choose the appropriate sampling technique and number of participants or informants to gather the data response saturation. Participants and informants in this study were Senior High School Science, Technology, Engineering, and Mathematics Strand students who were invited to take part in the SIP. One of the main goals in this phase was to identify competent participants and informants who were the best sources of information on their experiences, awareness, knowledge, and competence on the phenomenon of the challenges they had to deal with.

Moreover, through the use of purposive sampling, the individuals were selected. The qualitative research technique known as "purposeful sampling" is widely used to find and select cases with a richness of information and make the most of the limited resources available (Patton, 2002). Accordingly, as indicated by Mendres (2016), this meant locating and selecting individuals who had specific knowledge about or experience with a phenomenon of interest.

The likelihood of the phenomena, the theoretical standpoint, as well as the target participants' features were all factors that the researchers strictly adhered to while choosing the study's participants. The study's informants were the Grades 11 and 12

Science, Technology, Engineering, and Mathematics Strand students from Montevista National High School who took part in the SIP in the 2019–2020 school year.

Additionally, since this number is ideal for the study in terms of dealing with the problems and providing enough information about them, particularly in establishing themes and reaching meaningful conclusions, the researchers chose seven for the In-Depth Interview and seven for the Focus Group Discussion (FGD). If the data were incomplete, the interview or the inquiry would still go forward. Even while the concept of saturation was useful, it didn't offer much assistance in terms of determining the sample size needed for thorough research prior to data collection. Only seven sources were identified during the literature search for the context of any study (Cresswell 2013; Morse 1994) that gave recommendations for the actual sample size.

Data Collection

In their capacity as researchers, they followed a strict process for gathering data. Prior to the conclusion of the research project, they were also involved in a number of actions in the data collection procedure.

The initial phase of the formal conduct of the study was the researchers' endorsement as BERF grantees and the creation of the interview guide questionnaire, which was then validated by specialists.

Second, for authorization to conduct the study in one of the schools in the Davao De Oro Division, researchers had to contact both the division superintendent's office and the principal.

Third, participants were identified. Researchers made sure that persons who were recommended had firsthand knowledge of the phenomena under study.

Fourth, after the participants completed the consent form and their professors were made aware of the study's goals, focus groups and one-on-one in-depth interviews took place at the scheduled time and place. To personally conduct the one-on-one in-depth interview and focus group discussion, researchers prepared open-ended questions. To establish validity and reliability, which were crucial in the study's conduct, a voice recorder was used.

Fifth, to prepare them for transcription, recorded interviews were put on a computer or other accessible drive. To increase the accuracy of the data analysis, answers were verbatim transcribed.

Lastly, a theme analysis was carried out. Experts aided in the process to make sure that participant responses were properly examined in light of the main concepts.

Data Analysis

After being gathered and organized, the data was then examined and evaluated by the person in charge in order to ensure its legitimacy and correctness, whether it came from verified or unreliable sources. Data analysis is the process of applying statistical and/or logical procedures to data in order to illustrate, summarize, analyze, and evaluate it. Obtaining raw facts and transforming it into useable information is also a process. This information was used as the foundation for decision-making throughout the presentation of the data, in response to queries, and in accepting and refuting offered and put forth theories.

Colaizzi's approach of data analysis was notably used in the study, allowing for the identification of unique information and providing insights into the experiences. Colaizzi's (1978) method of data analysis is rigorous and robust, making it a qualitative approach that

ensures the authenticity and dependability of its conclusions. It provided a straightforward, understandable way for studying the underlying framework of an event, allowing researchers to spot emergent themes and the relationships between them. Understanding people's experiences was made possible with the help of Colaizzi's phenomenological method.

Additionally, to evaluate the participant responses, theme analysis was performed. The seemingly unrelated information was made sense of using thematic analysis. Because it was adaptable and a more important tool for data analysis, this method was highly useful because it could likely provide for a huge group of data. It was utilized, in accordance with Boyatzis (1988), cited in Komori (2016), to analyze qualitative data and methodically discover and cultivate empathy for a person, an interaction, an organization, or a culture.

The process of theme analysis involved data reduction, in which irrelevant facts were eliminated and transformed into information that was important for the study so that the information collection could be easily created and comprehended by the readers. The transcribing process for this investigation is highlighted by the phases below:

First, in order to fully transcribe the information that was gathered during the interview using a mobile phone and handwritten field notes, the researchers read through and observed the participants' comments from both the focus group discussion and the in-depth interview.

Second, for participants to understand immediately, the research questions were translated from English to vernacular or Visayan medium of instruction. Third, all interview

transcripts and filed notes were given identification codes that included the names, titles, or pseudonyms of the participants, and the researchers then identified the data sets that had been generated for the study.

Finally, responses were grouped under each question and sub-questions and submitted the data to the data analyst for the purpose of generating themes which were derived on the basis of the participants' responses. Having the emerging patterns in the data, the researchers assigned the responses corresponding to its supporting statement.

Reliability of the Study

According to Lincolon and Guba (1985), the objective of trustworthiness in qualitative research was to support the assertion that the findings were significant enough to merit attention. It is a way of ensuring the accuracy of the research study's findings. This differed significantly from the typical experimental precedent of trying to demonstrate validity, soundness, and importance. The study also sought to address the study's credibility by assuring the participants that their contributions would be kept private and that any information they provided would remain contained within the four walls of the room used for the interview or information gathering. Participants also received unequivocal guarantees that their testimony and personal information wouldn't be disclosed or shared with anyone. Furthermore, this study highlighted how each participant's name title was assigned either choice depending on their source signatories in order to conceal their unique identities and maintain direct privacy.

Trustworthiness is the ability to be relied on as honest or truthful, this can be achieved in research when gathered data generally applicable and consistent. It was

guided by the research lens and the paradigm assumptions that aided the study's methods, and it is crucial to underline the significance of the interview's recording in order to guarantee that the information presented was effectively captured (Guba, 2008; Thomas et al., 2005). Credibility, transferability, dependability, and confirmability are the four challenges of trustworthiness that must be addressed in any single qualitative research endeavor.

Credibility is defined as the assurance that can place the reality of the research outcomes (Lincoln & Guba, 1985). Priority goal of this study was to gather results which were believable and to address credibility, first, the individuals were selected in a way that was as efficient as feasible, according to the researchers. They chose students who had taken part in the training for conducting SIP and were credible sources for sharing in-depth life experiences, coping mechanisms, and personal insights. Second, when designing the study process, the researchers held in-depth interviews and focus groups to elicit opinions and ideas on the issues and difficulties that students faced when completing SIP.

Transferability is referred to as a method of establishing a certain level of external validity by Lincoln and Guba (1985). By adequately describing a phenomenon, one can determine how much the conclusions drawn are generalizable to different times, settings, events, and people. In this study, the researchers addressed transferability by including information and documents provided to capture pertinent research questions and answers that were reliable and comparable to a similar situation. This allowed researchers to access resources and connections to create novel conclusions that could serve as the foundation for further research study.

Dependability highlights the requirement for the researchers to take into account the dynamic setting in which research is conducted. The researchers were in charge of outlining how the setting changed throughout time and how that changed how the research was conducted Lincoln and Guba (1985). The researchers chose participants for both in-depth interviews and focus groups who could relate to the questions or queries posed during the conduct in order to address the issue of dependability in this study. The results' stability was based on the saturated data gathered from each participant's response to each question. In accordance with the responses provided by the participants during the interview process, the researchers also made sure that the data were properly recorded, noted down, and transcribed before realizing the process of reducing data followed by the submission of data for analysis in order to produce themes from the participant information being transcribed.

Conformability is the extent to which the findings could be verified or validated by other parties. Numerous tactics exist to improve it. According to Anney (2014), researchers can record the producers checking and rechecking the data outcomes. This process can be documented (Brown, 2009)**.** In this study, the researchers employed techniques to help them facilitate the validation cross-validation of data using more than two sources. Also, researchers used triangulation technique through gathering data to gain a plenty perspective of the said investigation.

Ethical Considerations

Ethics looks for justifications for doing or not doing something, for endorsing or disendorsing behavior, and for accepting or rejecting ideas about virtuous or vicious behavior or good or bad principles. At both the individual and societal levels, ethical issues

can be addressed. Since research has a moral component, care should be taken to protect the participants' involvement in the study so that the way the study was conducted did not affect them. The following five (5) basic moral principles were followed throughout this phase, including beneficence or no damage to participants, justice, confidentiality of information exchanged, anonymity of research participants, and informed and voluntary participation (Halai, 2006).

Before starting this study, the researchers had to submit some important paperwork, like informed and voluntary consent, to the relevant authorities in order to formally request permission to look into the impact of the intervention program on the students at Montevista National High School using SIP. The researchers had to make sure that each person was safe, keep their identity a secret, and offer them full support in order to ensure that their thorough investigation adhered to ethical standards in the conduct of the study, such as beneficence, justice, respect for people, confidentiality of information, and consent, as cited by Mark et al. (2005).

Researchers made sure that the information, testimonies, and details provided by the participants were kept secret in order to protect the confidentiality of study subjects and the privacy of information. They provided any supporting materials for any declaration of agreement to refrain from uploading or downloading their audio recordings of defenses. With the understanding that their names wouldn't be used in the study, they were asked to provide pseudonyms in order to protect their identity. Participants were required to maintain their anonymity and confidentiality, and every effort was made to guarantee that their personal information couldn't be linked to the information they supplied in any presentations, or other forms of distribution (Crow & Wiles, 2008).

Other criteria for qualitative research is the beneficence of the participants or no harm to them. The safety of the participants was a top priority for the study's researchers, who ensured it by taking care of them and keeping a careful eye on them as they moved from their special environments to the interview site. To prevent any mishaps, participants were then prohibited from using any two-wheeled vehicles, such as motorcycles. In order to prevent participants from being hungry while sharing their ideas during the focus group discussions and in-depth interviews, lunches were also provided to them during the course of the interviews.

Additionally, the researchers were unable to dismiss the possibility that an emotional incident would arise during the data collection. They advised the participants not to dwell on emotionally upsetting memories but rather to accept that feeling sad or angry at times was a healthy approach to cope with stress. The results showed that beneficence required a commitment to minimizing risks to research participants and maximizing the gains owing to them. No recorded file was ever left unattended or insecure, and participants were always kept safe (Bricki & Green, 2007).

Last but not least, justice was a research standard that needed to be addressed in this qualitative study. Giving participants their fair credit for their contributions in this phase was expected because it relates to their sincere efforts on constructing also shaping for success. Each participant received a token and a certificate of participation as a method of expressing gratitude for their contributions and to fully acknowledge their full force effort in the conduct of the said study. Participants received assurance that the kids would draw inspiration from their experiences in addition to recognition for their sincere efforts.

Chapter 3

DISCUSSION OF RESULTS AND RECOMMENDATIONS

This chapter presented the data collected and analyzed with the guidance and consultation of the data analyst assigned to this particular study. The information is laid out in a tabular format to help with analysis of the study and to highlight the key issues that came up in the in-depth interviews and focus groups.

The study's methodology produced a significant amount of data that are crucial to this endeavor. The data was acquired using two (2) methods, including in-depth interviews and focus groups, both of which were tape- and phone-recorded. The informants' comments are carefully recorded and examined by data categorization or by identifying emergent themes. The information gathered was utilized to assess the students' experiences, coping strategies, and insights after they completed Science Investigatory Projects as part of an intervention program.

There are four sections in this chapter. The participant information from which the qualitative data were compiled is the focus of the first section. The processes for data analysis and the steps in categorizing the new themes discovered through participant focus groups and in-depth interviews are covered in the second section. The third section addresses the responses to the questions from the focus groups and in-depth interviews that were related to each study problem. The summary of the participants' findings and an outline of the responses from the various informants are included in section four.

Participants

In-depth Interview

Reflected in Table 1 were the key informants or participants' profile for in-depth interview where the participants code, pseudonym, age, grade/year level, and sex. The in- depth interview was conducted individually with seven STEM strand learners from Montevista National High School. They were selected based on their social affiliation and status revealing them as students who participated with the intervention program in conducting science investigatory projects. The information from the following informants was considered about their experiences, coping mechanisms, and insights in conducting science investigatory projects. Every format is designated with pseudonyms in order to hide and preserve confidentiality for covering their individual identities.

Table 1: Profile of the informants in In- Depth Interview

Participants Code	Pseudonym	Age	Grade/Year	Sex
IDI001	Diding	17	12	Female
IDI002	Badat	16	11	Female
IDI003	Dodong	15	11	Male
IDI004	Onyok	16	12	Male
IDI005	Inday	16	11	Female
IDI006	Lalang	17	12	Female
IDI007	Cardo	16	12	Male

Focus Group Conversations

The six participants in the focus group discussion are profiled in Table 2. In the aforementioned school, they were all STEM strand students. They identified themselves as participants in the intervention program for carrying out science research projects. These individuals' varied experiences during the focus group discussion were shared. More understanding among the participants was the goal of the debate. Similar to the in-depth interview, the original names of the participants were changed to pseudonyms to conceal their identities.

Table 2: Profile of the informants in Focus Group Discussion

Participants Code	Pseudonym	Age	Grade/Year	Sex
FGD001	Mark	17	12	Male
FGD002	James	16	11	Male
FGD003	Maymay	15	11	Female
FGD004	Chen	15	11	Female
FGD005	Jill	16	12	Male
FGD006	Flor	17	12	Female
FGD007	Bibing	17	11	Female

The fourteen informants shared a common interest and point of view regarding the chosen social preferences in dealing the public. Data were acquired for the first qualitative research question through focus group discussions and interviews, and themes were identified.

At first, interviewees felt awkward with all the materials installed in setting. So, the researchers explained to them its purpose that made them more comfortable as the interview went on. Gatekeepers are employed in qualitative research to help the researchers establish trust with the community of interest and gain access to relevant information. The gatekeepers' help will make the researcher's job easier, particularly when it comes to data collection (Hatch, 2002).

Upon identification of the number of the participants, the researchers invited them to be one of the participants in this study. There was debriefing done. The study's goal was explained to the participants, who then signed consent forms to participate in the study. Semi-structured interviews and focus group discussions were used to collect the data. The semi-structured interview is the most suitable and readily available data collection approach to obtain data validity and reliability in the target population frame (Cresswell, 2002).

The interview's findings produced a number of themes. The fabricated statement of the issue presented in the reviews chapter, however, came before the presentation of the results. Information compiled from the study participants' experiences, coping strategies, and insights as well as information gleaned from an in-depth interview and focus group discussions.

Categorization of Data

In categorizing data, the researchers organized, managed, and retrieved the most meaningful bits of data, which were collected during the group conversation and interview. For people who responded to the question in a language other than English, information from the audio cassette recordings was collected, directly transcribed, and translated into

English. To come up with the essential themes, the responses of the participants were grouped first, and their common responses were identified. Then, using the broad ideas shared by the participants as a guide, the data were collected and organized. The data was regrouped or reorganized to concentrate the key themes into fewer theme items, the emerging essential themes into fewer theme items, and the significant statements that emerged from the transcripts and comment as thematic statements or supporting statements. Three, four, and five tables show the data display.

What are the experiences of the students in conducting Science Investigatory Projects in the current research culture of the school?

The researchers used focused group discussions and in-depth interviews to hear the participants' voices from the participants they had chosen for the study. To get their experiences, coping mechanisms, and solutions to the issues, as well as their insights, a number of questions were thrown at them. Their responses served as the foundation for the development of the key topics, which have generally shed light on the investigation's goal.

based on the participants' responses, seven (7) essential themes were generated as reflected in table 3. These themes were labeled as demand for resources, difficulties with internet access, enjoyable activities, applicability to daily life, independence in performing tasks, development of skills, and solve problems in various ways. These emerging themes are supported and justified by the testimony of the informants during In-Depth Interview and Focus Group Discussion. This served as their evaluation how learning in research were realized inside as well as outside the classroom

Table 3: Experiences of Students in Conducting Science Investigatory Projects

Emerging Themes	Supporting Statement
Demand for Resources	• It became difficult to carry out SIP since our project requires laboratory tests that are so expensive. (IDI#004) • We needed to adjust our methodologies so not to require much amount. However, it affected the research design and results in the end. (FGD#003) • Doing research requires a lot of bond papers for printing. (IDI#006)
Difficulties with Internet Access	• Most of the related literature about our study can be found on the internet; however, we don't have internet access at home. (IDI#007) • There are times when we have task to search urgent information, but I really have a problem in connecting on the internet. (FGD#005) • Our home is situated in far flung area where there's no signal. (IDI#003)
Enjoyable Activities	• I like collaborating with my classmates because we can be able to brainstorm several brilliant ideas. (IDI#001) • Investigating problems are exciting as we unravel new discoveries. (FGD#001) • I really have fun in conducting experiments. (FGD007)
Applicability to Daily Life	• When we have group activity, I encountered difficulties but still I am happy because I can really use my experience in research in real life through weighing things such as identifying the cause of the problems. (FGD#003) • Learning research is difficult if you are not going to take it seriously, but I slowly appreciated it because when I contemplated it seemed like whatever situation we might encounter research is always present. Starting from cooking and even in the school. (IDI#003). • I feel happy because I can be able to apply the concepts, I learned in the school in facing the challenges outside. (FGD#007)
Independence in Performing Tasks	• I learned to be independent in managing my time as we developed it in learning research. (IDI#004) • While doing experiments, I also tried to work harder on my own. (FGD#006) • In performing activities, there are times when I needed to introspect and used my own potentials. (FGD#004)

Development of Skills	• I was able to develop my critical thinking skills which I was able to use during this years' Division SIP in Physical science category where I bagged the first place. (FGD#002) • My creativity was also ignited every time I was engaged in research. (IDI#005) • My communications skills were sharpened as I immersed in various write-ups and oral presentations of our outputs. (IDI#004)
Solve Problems in Various Ways	• We should learn to make things even we are alone specifically in doing schoolwork. It really helped especially in Math time because I can be able to show the solutions through different methods to be understood well. (IDI#006) • I was able to see situations through diverse perspectives and solve problems deductively. (FGD#004)

The following are the array of information confessed by the participants relevant to their experiences in research inside and outside the classroom.

Demand for Resources

The interviewees consistently mention the difficult work and expenses that must be budgeted for when asked about their experiences carrying out science investigative projects.

Similar experience shared:

> *"It became difficult to carry out SIP since our project requires laboratory tests that are so expensive."* (IDI#004)

Maymay added:

> *"We needed to adjust our methodologies so not to require much amount. However, it affected the research design and results in the end."* (FGD#003)

Lalang also expressed:

> *"Doing research requires a lot of bond papers for printing."* (IDI#006)

Furthermore, Al-Qaderi (2016) discovered in his research on the difficulties faced by undergraduate students when carrying out their research projects, Resources are essential to complete an output. Just like any other undertakings, SIP needs finances/budget to pay for the laboratory tests and rent facilities. Equipment, tools, and facilities are also required when doing controlled experiments since conducting SIP follows standard procedures and protocols. The demand for resources such as funds and facilities are crucial to research. There were times when students need to repeat experiments and do pre-trial investigations in which funds and facilities were needed already. In this case, the project become too costly and expensive. In order to remedy this, the students revised their methods and reduced the number of trials. According to Aedh and Elfaki (2019), this could ultimately lower the output quality.

Difficulties with Internet Access

Most of the participants revealed that internet plays a pivotal role in gathering information and communication needs of students and individuals. However, they also shared their voices about the difficulty they have faced in utilizing internet as they conduct their research.

Cardo quoted saying:

> *"Most of the related literature about our study can be found on the internet; however, we don't have internet access at home."* (IDI#007)

Jill also shared:

> *"There are times when we have task to search urgent information, but I really have a problem in connecting on the internet."* (FGD#005)

Dodong also uttered:

> *"Our home is situated in far flung area where there's no signal."* (IDI#003)

On the other hand, according to Gong (2009), during the past few years, people all over the world have increasingly used the internet as a social, commercial, educational, political, and personal tool. Gong (2009) noted that the internet has developed dramatically as a tool for information transmission and has become an integral part of people's lives. Internet users encounter various network issues when connecting to the internet from different locations, including connection drops, inconsistent speed, commutes that take a long time to refresh, failures to load, and session failures.

Enjoyable Activities

Common responses being shared from the participants in terms of their experiences in research, participants were also amazed on the display of outputs and having fun in coming up solutions from complex to simple problems. These activities provide opportunities for the students to deepen learning and at the same time and make use of it every day in life encounters.

Similar experiences shared by Diding when asked the same question, and she said:

> *"I like collaborating with my classmates because we can be able to brainstorm several brilliant ideas."*

Mark also shared:

> *"Investigating problems are exciting as we unravel new discoveries."*

In addition, Bibing also expressed:

> *"I really have fun in conducting experiments."*

The personalization of the learning environment and a sense of belonging, instruction that pushes students' thinking, opportunities for a high level of student engagement and involvement during instruction, self-efficacy, and high expectations for performance for all students are factors that are linked to improved achievement in middle school research classes (Wang, 2013).

Other informants shared that they enjoyed much by performing tasks by because they may be able to share ideas and at the same time learning in different way.

Applicability to Daily Life

The informants both from FGD and IDI have sometimes had difficulty in performing the tasks at a given time but then at the end of the day, they realized that it had a great help to be wiser sometime. Learning research gives a great help to apply the basic skills in the different situations in our daily lives.

Maymay openly shared:

> *"When we have group activity, I encountered difficulties but still I am happy because I can really use my experience in research in real life through weighing things such as identifying the cause of the problems."*

Dodong said:

> *"Learning research is difficult if you are not going to take it seriously, but I slowly appreciated it because when I contemplated it seemed like whatever situation we might encounter research is always present. Starting from cooking and even in the school."*

Bibing revealed:

> *"I feel happy because I can be able to apply the concepts, I learned in the school in facing the challenges outside."*

In recent years, studies on students' perceptions of themselves as learners have also received a lot of attention (Schuck & Grootenboer, 2004). Significantly, students' perceptions of their capacity for dexterous mathematical problem-solving, the value of developing their research skills, and the practicality of problem-solving in daily life were all thought to be connected to this motivation (Mason, 2003).

Independence in Performing Tasks

It is evident during the interview that in learning research, it teaches them to be independent in decision making and express their own ideas. It helps also to share ideas among each other with their own level of understanding.

According to the report, middle school kids prefer to face academic challenges. Researchers found that pupils desire to be personally challenged in their academics and think that teachers who don't challenge them academically aren't doing their jobs properly (Wilson & Corbett, 2001) after speaking with more than fifty students in an urban middle school in Philadelphia. In order to challenge themselves to look for solutions to questions and problems they are curious about, students want to be given control over their own learning.

Onyok emphasized:

> *"I learned to be independent in managing my time as we developed it in learning research."*

Flor added:

> *"While doing experiments, I also tried to work harder on my own."*

Chen asserted:

> *"In performing activities, there are times when I needed to introspect and used my own potentials."*

Development of Skills

Interviews revealed that different skills were being developed while learning research was being introduced to the students through different activities and group tasks.

In conclusion, new pupils have fewer skills than students in prior generations. Students today are more tech-savvy than prior generations (Noeth & Volkov, 2004). Even some evidence suggests that today's pupils see research more favorably than earlier generations did (Senk & Thompson, 2003).

James shared:

> *"I was able to develop my critical thinking skills which I was able to use during this years' Division SIP in Physical science category where I bagged the first place."*

Inday revealed:

> *"My creativity was also ignited every time I was engaged in research."*

Onyok shared:

> *"My communications skills were sharpened as I immersed in various write-ups and oral presentations of our outputs."*

According to DOST-Science Education Institute (SEI) and the University of the Philippines National Institute of Science and Mathematics Education (2011), which support the information above, SIPs help students become scientifically literate by inspiring them to be inquisitive, apply knowledge and skills, and recognize how science affects society.

Solve Problems in Various Ways

According to Wilson & Corbett's research from 2007, students wanted teachers that held them accountable for completing tasks, offered extra assistance, patiently explained concepts until every student understood them, and had the ability to manage behavior without losing sight of the topic. In a nutshell, they desired intellectual challenge and engagement. The researchers note that across the three years of interviews, students consistently mentioned these traits. They draw the conclusion that students' expectations of teachers are learning-focused as a result of this regularity.

Lalang shared:

> *"We should learn to make things even we are alone specifically in doing schoolwork. It really helped especially in Math time because I can be able to show the solutions through different methods to be understood well."*

Chen said:

> *"I was able to see situations through diverse perspectives and solve problems deductively."*

In addition, SIPs can "provide effective medium in the development of S&T consciousness among the youth, promote public understanding and appreciation of scientific breakthroughs, and improve the quality of S&T in the country," according to DOST-SEI (DOST-SEI & UPNISMED, 2011).

How do the students cope with the challenges in conducting Science Investigatory Projects in the current research culture of the school?

Table 4 shows the coping mechanisms by the students who are conducting science investigatory projects. Two (2) key themes emerged from the statements of the participants during the interview, and these are as follows: motivating oneself and being

resourceful. In order to explore students' coping strategies and responses, participants were asked questions about what they had done in dealing with the challenges encountered in conducting science investigatory projects. Participants sincerely answered the questions, and from their responses, two (2) key themes emerged.

Table 4: Coping Mechanisms of Students in Conducting Science Investigatory Projects

Emerging Themes	Supporting Statement
Motivating Oneself	• I always do my best to have research that can help many people". (IDI#006) • I never commit absences because I don't want to skip my research class because I can learn many things from it that I can use someday. (FGD#005) • Even it requires lot of time and money, I always make it as motivation in doing my best in excelling in research so that when I will become an expert, I can use my knowledge in uplifting my parents from poverty. (IDI#004)
Being Resourceful	• We modify our experiments in our laboratory because we don't have chemicals to be used". (FGD#003) • Not all of us have internet access, I borrow cell phone to my classmates who have internet connection and sometimes go to municipal plaza to avail free WIFI so that I can research. (IDI#004) • Because I don't have internet access, I read books in the library to find related literature. (FGD#5)

Motivating Oneself

The importance of being joyful and motivated in life to look forward and live life to the better place is emphasized in the majority of responses provided by participants who are doing science investigatory projects on coping mechanisms. Just accept the bad things

that have happened to you and keep accepting new information. These are some responses that the participants gave regarding the difficulties and problems they encountered.

Lalang mentioned:

> *“I always do my best to have research that can help many people”.*

Jill also shared:

> *“I never commit absences because I don’t want to skip my research class because I can learn many things from it that I can use someday.”*

Onyok supported that:

> *“Even it requires lot of time and money, I always make it as motivation in doing my best in excelling in research so that when I will become an expert, I can use my knowledge in uplifting my parents from poverty.”*

The immune system is strengthened, chronic disease is prevented, and those who are optimistic are better able to handle bad news. Gratitude is linked to optimism, and it has been found that thankful people are happier, receive more social support, are less stressed, and suffer from less depression. According to recent research, optimists and pessimists approach difficulties in different ways, which affects how well they are able to deal with challenges (Shukla, 2018).

The ability to manage stress and impulse control are part of coping with stress. How to handle stress is the capacity to resist negative events and difficult circumstances and actively and energically conquer the stress. The capacity to maintain composure and patience is related to one's resilience to cope with stress. On the other side, impulse

control refers to the capacity to withstand and postpone an urge or temptation to act. Last but not least, mood is the final aspect of emotional intelligence (Hassan and Baba, 2008).

Being Resourceful

A researcher should always think beyond the box, according to other words frequently used by participants during the data collection process in both focus groups and in-depth interviews when they were asked to respond to the same questions.

Another data as Maymay revealed:

> *"We modify our experiments in our laboratory because we don't have chemicals to be used".* (FGD#003)

Onyok also added:

> *"Not all of us have internet access, I borrow cell phone to my classmates who have internet connection and sometimes go to municipal plaza to avail free WIFI so that I can research."*

Jill shared:

> *"Because I don't have internet access, I read books in the library to find related literature."*

On the other hand, recent research has discovered a substantial relationship between children's resourcefulness and their gender, age, and optimistic thoughts. A different set of studies proposed that a youngster might possess personal traits that point to the potential to develop into a highly resourceful adult later in life. These qualities include the capacity for rapid conceptual understanding, the capacity for pattern recognition, the preference for accuracy, acute observational abilities, and the enjoyment of a wide range of activities, such as thinking through challenging topics (Cheang, 2018). Further studies have discovered that a child's capacity for resourcefulness and the kind of coping

mechanisms they employ are more likely to develop when they tend to have positive cognitions as opposed to negative ones (Zauszniewski et al., 2008).

What are the insights of the students in conducting Science Investigatory Projects in the current research culture of the school?

Table 5 shows the insights of the students who are conducting science investigatory projects. The participants' replies shared throughout the in-depth interview and focus group discussions led to the development of four (4) emergent themes. Consistent participation, school and parent support, teacher and student training, and encouraging pupils to engage in research are also important factors.

Table 5: Insights of Students in Conducting Science Investigatory Projects

Emerging Themes	Supporting Statement
Consistent Engagement	• Students should engage in research because it can boost creative thinking skills. (IDI#006) • They should not stop doing research because it can help ignite curiosity about the world. (FGD#003) • Patience and perseverance in doing research can bring us to the best outcomes. (FGD#004)
Support from the parents and the school	• Our parents should be aware about the importance of conducting research so that we can be able to receive additional moral and financial support from them. (IDI#002) • School should allot extra financial support to our research because we don't have enough resources to be used. (FGD#004) • The scientific breakthrough that we might discover will not only be credited to us students-researchers but also to the school. Corollary, we are hoping that they will give assistance for us so that we can continue with our research. (IDI#006)
Training for Students and	• I hope that trainings for conducting scientific research could be done every semester. (FGD#001) • Teachers shall also undergo trainings and make their own research so that they can mentor us well. (IDI#4)

Teachers	• I want to participate in research conventions so that I will be updated in the trends of research. (IDI#001)
Promote the benefits of research among students	• We should encourage students to conduct research because this can possibly solve the existing problems in our community. (IDI#005) • I will urge them that if we continue to pursue research, we can bring honor and recognition for our school. (FGD#006) • We can have a chance to represent our country for International Science and Technology fair. (IDI#007) • We will be able to earn a living if we will become experts in conducting research. (FGD#002)

Consistent Engagement

Aside from motivating ones-self and resourcefulness, consistent engagement is the term articulated During the data collection process both detailed and focused group discussion when they were asked to response on the given queries. Contributors made themselves as advocate in mitigating and promoting research in school as part of their coping strategies and techniques in conducting science investigatory projects.

Lalang quoted:

> *"Students should engage in research because it can boost creative thinking skills."*

Maymay also shared:

> *"They should not stop doing research because it can help ignite curiosity about the world."*

Chen also revealed:

> *"Patience and perseverance in doing research can bring us to the best outcomes."*

According to Crone (2008), if you get a student involved in an active learning environment, they can develop their critical thinking skills and become less passive. Garside (2006) described critical thinking as thinking that is clear, precise, accurate, relevant, logical, and consistent; thinking that reflects a controlled sense of skepticism or disbelief of any assertion, claim, or conclusion until sufficient evidence and reasoning are provided to conclusively support it; thinking that takes stock of existing information and identifies holes and weaknesses, thereby certifying what we know and don't know; and thinking that is free from bias. The description given above demonstrates how crucial it is for students to cultivate critical thinking skills since they will help them both in their academic endeavors across all subject areas and in their professional lives (Dancer, 2005). Although there are many advantages to participation, according to the study that has already been done, there are still very few students that participate, and insufficient time is spent in class discussing topics in the classroom (Fritschner, 2000).

Support from the parents and the school

Thus, there are a lot of prospects for success when parents get involved in their kids' educational journey. Parental involvement in their children's education, according to Centre for Child Well-Being (2010), enhances a child's motivation, attitude, and academic performance across all subject areas and also fosters improved conduct and social adjustment. It also states that parental involvement in a child's education aids in the development of responsible, productive adults. This indicates that including parents in their children's education is equivalent to stating that the school is proactive in bringing about improvements or student growth. School administrators and educators are more likely to achieve high-quality educational reform when parent participation grows. In the

investigation by Mapp K. likewise Henderson, A. According to the authors of a 2002 article titled A New Wave of Evidence, The Impact of School, Family, and Community Connections on Student Achievement, "most students at all levels - elementary, middle, and high school - want their families to be more knowledgeable partners about schooling and are willing to take active roles in assisting communications between home and school." The study continues, "When parents come to school regularly, it reinforces the view in the child's mind that school and home are connected and that school is an integral part of the family's life. In short, parents' involvement in their child's learning process offers many opportunities for success" (Clinton & Hattie, 2013).

Badat shared:

> *"Our parents should be aware about the importance of conducting research so that we can be able to receive additional moral and financial support from them."*

Chen added:

> *"School should allot extra financial support to our research because we don't have enough resources to be used."*

Lalang also emphasized:

> *"The scientific breakthrough that we might discover will not only be credited to us students-researchers but also to the school. Corollary, we are hoping that they will give assistance for us so that we can continue with our research."*

The education of children is greatly impacted by parent-teacher partnerships. Parents are more at ease when required to participate in school-related activities, according to Llamas and Tuazon (2016). A school's physical and academic performance can be

improved with the help of parents and school administrators working closely together. As a result, school leaders must inspire parents to participate and contribute to the achievement of the school's missions and objectives (Sapungan & Sapungan, 2014).

Trainings for Students and Teachers

The majority of the participants acknowledged that they all gave the same answers to the questions. Regarding what participants went through, came across, or even had. By providing training for instructors and students, they hope to improve the school's research culture.

Mark asserted:

> *"I hope that trainings for conducting scientific research could be done every semester."* (FGD#001)

Onyok also added:

> *"Teachers shall also undergo trainings and make their own research so that they can mentor us well."*

Diding also revealed:

> *"I want to participate in research conventions so that I will be updated in the trends of research."*

Due to their effectiveness in including students in the teaching and learning process, seminars have been employed as a teaching strategy ever since Socrates. The fundamental meaning of Socrates' ideas must be understood by pupils through analysis and thought employing higher-level thinking abilities, which Socrates did not explicitly teach but rather through the situations and issues he highlighted (Bates, 2016).

Therefore, by adding their experience, identity, and beliefs to the learning and teaching process, students are seen as participants in changing reality and discovering truth (Dewey's principles, referenced in Bates, 2016). According to Dewey's Principles, teachers should not simply impart knowledge to their pupils; instead, they should provide opportunities for experience in which pupils can interact, form opinions, and reflect on what they have learned with the aid of teachers acting as facilitators and guides, which supports pupils' active engagement (Weber, Gabbert, & Patrick, 2007).

As participants read a variety of sources and combine information that is relevant to the seminar's objectives, seminars also help participants develop their critical reading and writing skills (Playmouth, 2011). Additionally, they offer a forum for researchers, educators, and students to present their research findings in front of an audience and receive regular feedback from the participants through conversation. As a result, it broadens participants' awareness of other researchers' findings, fosters an intellectual environment at work or school, and ensures that participants stay current on topics in the discussion's topic (Illinois, 2015). As a result, leading and attending seminars can help you improve your communication, management, and presentation skills, and if you're not a big reader, attending seminars is a terrific method to learn new things (Chaman & Wells, 2012).

Promote the benefits of research among students

According to studies, when students were exposed to problem- and project-based assignments like SIPs, their self-efficacy increased and they learned 21st century abilities including cooperation, problem solving, and critical thinking.

Inday assessed:

> *"We should encourage students to conduct research because this can possibly solve the existing problems in our community."* (IDI#005)

Flor confessed:

> *"I will urge them that if we continue to pursue research, we can bring honor and recognition for our school."* (FGD#006)

Sentiments of Cardo expressed:

> *"We can have a chance to represent our country for International Science and Technology fair."* (IDI#007)

James emphasized:

> *"We will be able to earn a living if we will become experts in conducting research."* (FGD#002)

Science investigatory projects (SIPs) give students firsthand exposure to the scientific method as it is used by scientists to undertake investigations and explorations within a field of study. Making contributions to the body of knowledge, having a positive impact on the community, and inventing new things are all things that may be done through SIPs, all for the benefit of humanity (Lebednik, 2016). Science research emphasizes the value of sustaining a living, protecting the environment, and making progress that is sustainable while it advances Science and Technology. As a result, by immersing students in problem-based tasks, genuine learning activities, and inquiry-based studies, SIP helps students develop their problem-solving, critical, and creative thinking skills. Because of this, they are better able to turn their curiosity into questions, hypotheses, experiments, and attempts to establish the truth (Nahadi & Sriyati, 2017).

Implication for Further Research

Since this study was limited to fourteen (14) participants from Montevista National High School, the following implications for future research are forwarded: Further studies might look at the experiences of students who are working on science investigations, and it could re-interview the study's informants to see if their perspectives, coping strategies, and experiences have changed over time. While this study was specifically conducted at the Senior High School department at Montevista National High School, additional research might be done to look into the similar phenomena among students working on Science Investigatory Projects in the Davao de Oro Division.

With the collated data from the key informants, Montevista National High School can use this as their tool to design programs and strengthen implementation to policies that could help to intensify research culture in the institution.

Concluding Remarks

The main objectives of research teaching for students are for them to comprehend the information provided, use the abilities, and remember the concepts later. There is no point in students remembering a formula or process to prepare for a test tomorrow if they will have forgotten the main idea by the following week. Teachers must put their attention toward ensuring that the pupils comprehend the material and not merely memorize the steps. Being a teacher in today's world presents many problems, therefore if you want to succeed every day, you must embrace change. Regarding the K–12 Curriculum, researchers are aware that the Department of Education would not be able to achieve its objective if teachers did not take into account the modern trend in how students behave

and learn, as a good approach for the students to enhance learning where they can develop 21st century skills.

Results revealed that the students who took part in the study engaged in fun activities as part of a scientific investigation; and they learned and developed necessary skills needed to enhance learning while having fun within the group as needed in the 21st century learning. However, the findings indicated that these participants had problems with the research process as well. Since the Department of Education aims to develop students' capacity for self-directed learning, teamwork, goal orientation, sense of responsibility, and accountability when implementing the program as part of the K–12 Curriculum, teachers must address and design strategies to meet these expectations and what should be realized for the students. The department is much encouraged to help the teachers to develop more strategies and activities for the students to appreciate the conduct of research and its impact not only in science but also towards other learning areas as well to attain quality education.

Dissemination and Advocacy Plans

Implications for Teaching Practices

The findings of this study on the opinions and perceptions of millennial students on learning research suggest that both instructors and students can make progress in their efforts to enhance instruction and learning in the twenty-first century. In research, students experienced different enjoyable activities that they found more fun. It provides students with opportunities to deepen their learning and at the same time having fun while learning and be able to apply concepts and skills in real life. As students exposed to the various strategies and assessed the outcomes, they are becoming more self – confident and learn how to deal with stressful situations.

In order to properly teach children and satisfy all of their various learning needs as pupils advance in the 21st century, it is crucial that school administrators continue to create solutions. As they cooperate and support one another, students find their paths. Teachers must develop and improve their research teaching practices in light of this.

Lastly, teachers have an important role to perform and must carefully arrange their lessons and supervise their students at all times. For the benefit of the pupils, teachers must offer a variety of activities while taking time limits into account when choosing those that would work best over the long term. Gaining mastery of skills necessary for success in the course or in a career, as well as increased enthusiasm for self-directed learning—the kind of enthusiasm that can motivate students to pursue independent research or honors projects—are just a few of the many advantages that can result from this approach. Students may also participate more actively in all aspects of the course.

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