

Driving Forces of Students' Choice in Specializing Science: A Science Education Context in the Philippines Perspective

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Abstract Science education plays a significant role in the country's economic development. It brings technological advancement, promotes national wealth, and improves health and industry. In this context, the qualitative study explored the participants' experiences regarding their choice in specializing science. Narrative inquiry from four purposively selected and interviewed graduating students of secondary education in Teacher Education Institutions in Northern Negros Philippines determined and described that *personal interest, nature of science, family influence* and *teacher's impact* drives their interest to specialize science. Data analysis involved a simplified version of Groenewald's coding and categorizing of the participants' responses (*Cebuano*) which then transcribed and translated to the English language. The emerging themes are essential in students' choice in science. Thus, academic institutions may revisit and review its science curriculum, provide state-of-the-art laboratory facilities, strengthen teacher's mastery and competence through professional advancement, and involve parents in school's career campaign to attract students' to pursue science education.

Keywords: driving forces, narrative inquiry, students' choice in science, science education

Introduction

In this digital and fast-changing era, knowledge-based economy in science education has a vital role in economic and social development. This knowledge breakthrough seeks an innovative paradigm through scientific skills that serves as a gateway to meet the countries' promising global economic growth (Morales, 2017). Science education motivates people in all countries to combat the challenges of having quality and excellent science education. To keep pace with the demands of global competence in science education, something must be worked on to make such powerful tool for economic expansion.

Looking at the global perspective, the challenges of having quality science education are evident as the world experiences a drastic decrease in students' interest in science careers. Trends were seen in Norway, Denmark, Germany, and the Netherlands which experienced a progressive decrease of 40%, 20%, 20%, and 6%, respectively. The result coincides with the survey findings of Mnanka (2017) that only 25%-26% of students pursued physics and chemistry in developing countries, and further manifested in the number of graduates in physical science, which decreased by 50% based on the Global Science Forum Report (GSFR, 2009). Moreover, the Organization for Economic Co-operation and Development (OECD, 2013) confirmed the statistics above and stressed that the majority of students opt out of scientific careers. Relatively, Lyons (2009) perceived that the increasing reluctance of students' who opt for science careers implicates scientific literacy of future generation, and the persistent decline has generated concerns in Australia, Western World, and ASEAN countries such as China, Hong Kong, Japan, Singapore and Philippines as highlighted by the National Science Foundation (Chang, 2014; Leung & Zhu, 2011; Muruyama, Pekrun, Lichtenfeld & vom Hofe, 2013; NSF, 2018).

Despite the pressing problem on students' interest in science education, well-documented literature revealed that researches

on factors associated with students' interest in science are less explored. In an instance, according to Department of Science and Technology (DOST, 2015) 73% of the agency's personnel are researchers, 47% are distributed in public and private government institutions where 9,508 are in Higher Education Institutions (HEI's), 75% are in public and 25% are in private institutions. Significantly, 24% of researches are in natural sciences, 12% technology and engineering, 20% agricultural sciences, 8% medical sciences, 8% social sciences, and 11% are in humanities. The World Bank Data (WBD, 2013) conveyed that the country has only 188 researchers per million people. In Region 6 where the study was conducted, the author identified 625 researchers where 508 are in-state universities and colleges, and 117 are in private HEI's. The given figures on the number of researchers implied an insufficient number of researches explored concerning science education in the country and across the globe. This phenomenon revealed that science education researches focused mainly on the following: how gender and ethnic background issues on science careers choice (Balakrishman & Low, 2016), students' career choice and aspiration (Tan, Barton, Kang, & O'Neill, 2013; Wang, 2013), the teaching methods to develop science career interest (Dabney, Tai, Almarode, Miller-Friedmann, Sonnert, Sadler, & Hazari, 2012), and gender inequality influence interest in pursuing a career in science teaching (Morales, Avila, & Espinosa, 2016). The author claims that the aforesaid indicators impede the long-term growth of producing science teachers and experts in the country, and in the global arena (Sein, Jun-Ki, & Minsu, 2017).

The Philippines has been dramatically encountering this global phenomenon. For instance, the Commission on Higher Education (CHED, 2015) reported that among 725,183 students enrolled in Teacher Education Institutions (TEI's), only 7% (6,978) are specializing in science. In the TEI's where the study was conducted, the number of students enrolled in secondary education specializing in science is small in number of which two are specialized in biological science in private and two are

specialized in physical science in state college. The aforesaid phenomenon on the scarcity of students enrolled in science education creates implications in the Department of Education (DepEd) as Secretary Leonor M. Briones of DepEd stressed to the members of the House Committee on Appropriation during the agency's presentation of the proposed budget for 2017, "*We have a challenge in hiring Math and Science teachers, we need a huge army of teachers,*" (DepEd, 2016).

The ultimate goal of science education is for students to acquire scientific literacy. However, the country is facing serious challenges in having quality science education as Filipino students' achievement lags behind other countries in the Trends International Mathematics and Science Study (TIMSS, 2009) and in the recent result in Programme for International Student Assessment in Science, the first time that the country had participated (PISA, 2018). Also, during the World Economic Forum among 140 and 138 countries, the Philippines ranked 67th and 79th in terms of global competitiveness in quality science education in 2016 and 2017. The frustrating results in the international standards of quality science education is congruent to the decreasing results in the National Achievement Test (NAT) in science, which shows 49.26% in (2008), 47.40% (2009), 46.30% (2010), 40.53% (2012), and 41.35% in (2013). Moreover, the Department of Science and Technology (DOST, 2019) reported that out of 73,712 graduating high school students who took the rigid science scholarship examination only 13.37% (9,852) clinched a slot in the country's premier science scholarship program for A.Y. 2019-2020. The record shows that 59.06% (5,819) qualified as scholar under RA 7687 scholarship program for academically talented students who belong to economically disadvantage families, while 40.94% (4,033) top ranking examinees passed under the DOST-SEI merit scholarship program which is awarded to students with high aptitude in science and mathematics and are willing to pursue careers in science, technology, engineering, and mathematics (STEM). In spite of the given state, graduating students from secondary schools enter college without a clear idea and solid

decision on what degree program or career to pursue (Ramirez & Dizon, 2014). Mangaoil, Rungduin, Abulencia, and Reyes (2017) pointed out that incoming college students experienced indecision concerning career decision-making, which their parents have influenced their career choice. Many students don't have enough capacity and consciousness to process and apply information from different perspectives, and have difficulty in contextualizing this knowledge for the realization of their profession (Aguado, Laguador, & Deligero, 2015). Significantly, parents and teachers contribute to students' career choice; however, it depends on how students perceive their life in the future.

Increasing students' interest in science education is not simply a challenge to scientific organizations and professional scientists, but also to the different HEI's offering secondary education with specialization in science not only in the Philippines but across the globe. This phenomenon of declining trends in students' interest in science and the shortage of researches explored in science education explicitly on the driving forces of students' choice in specializing science prompted the author to conduct the study through qualitative analysis to deeply understand the driving forces, and reciprocate its advantage to attract students' to specialize in science. Thus, all generated information may provide significant value to science teachers and researchers working on similar objectives.

Purposes of the Research

The study explored the driving forces of students' choice in specializing in science. It established empirical evidence to acquire in-depth understanding on the identified driving forces and reciprocate its advantage to address the declining interest of students in science education. Moreover, due to the shortage of studies on students' interest in science, the current study will shed light to the literatures on the factors that influence students' choice in specializing science with the end view of proposed initiatives

to increase students' interest to pursue science education and uplift the field of science in the country. Specifically, this sought to answer the following statements: 1) determine the driving forces of students' choice in specializing science, and 2) describe the driving forces' implications to students' interest in science education.

Methodology

Research Design

The study utilized the qualitative research design using narrative inquiry to deeply understand and interpret the experiences of the participants relative to the driving forces in specializing science. Specifically, the participants' narratives were taken into account to be part of the analysis of the study in which their respective stories are imprinted. Through such, discovery of meaning on the factors that influenced the participants' decision to specializing science had been plausible.

Participants

The scarcity of students who are presently enrolled specializing in science in the TEI's of Northern Negros Philippines limits the participants of the study. Purposive sampling was used to determine the four qualified participants who are graduating secondary education students specializing science. Specifically, two of whom were biological science and two were physical science majors from the identified private and public HEI's in the country. The selection process used the following inclusion criteria: a) experienced the phenomenon being studied, b) officially enrolled for the academic year 2017-2018 in the TEI's in Northern Negros, Philippines, c) taking secondary education specializing in science, and d) graduating students. Table 1 shows the profile of the participants.

Table 1. Profile of the Participants in the Study

Participants (N=4)	School Origin	Specialization	Gender	Total	Total
P1	Private HEI	Biological Science	M	M	2 Biological Science
P2	Public HEI	Physical Science	M		
P3	Private HEI	Biological Science	F	F	2 Physical Science
P4	Public HEI	Physical Science	F		

P (participant) HEI (Higher Education Institution) M (male) F (female)

Since the study involved students as participants, the author sought ethical approval and permission from the participants prior the conduct of the study with the purpose, procedures, and possible utilization of their recorded interviews were explained to ensure accurate transcription of data. The participants signed a consent form to manifest their voluntary participation and utilization of their recorded interviews. Participants were then coded P1, P2, P3, P4 to protect their identity and to assure the confidentiality of the information given.

Instrument

The study utilized a researcher-made semi-structured interview guide with five open-ended items validated by three experts on qualitative analysis and research instrumentation. Refinements to the researcher-developed questionnaire were made to capture the participants' experiences on the driving forces in specializing science. The following are the items in the interview guide 1) What can you say about science as a discipline? 2) Why did you choose science as your major/specialization? 3) What are your science experiences? 4) What motivated you to take science as your major/specialization? In what way? 5) Who motivated you to take science as your major/ specialization? How are you motivated?

Data Collection

The study gathered data through in-depth individual interviews using a digital audio recorder to record the participants'

responses to ensure accurate transcription of data while facial expressions, gestures, annotations, emphasis, pauses, and silence were documented in the field notes.

The author met the participants and explained the nature of the study then scheduled the interview at their most convenient time since they had their practice teaching in other schools. Interviews with the participants run approximately from 15 to 25 minutes where they precisely described their experiences on their choice of specializing science. Using their local dialect (*Cebuano*) which are then transcribed and translated to English language. The author asked probing questions to clarify ambiguous responses for logical interpretation of data. To avoid biases, the author based the interview from the standard interview guide, and not from his knowledge as suggested by Yin (2011).

The following constructs: transferability, conformability, dependability, and credibility established the rigor of the study (Tobin & Begley, 2004). *Transferability* was manifested as the participants richly described their experiences in specializing science, then formed into clusters of meaning and grouped as to the essential themes it conveyed. Check-re-check strategy established *conformability* of the findings transcribed during the interview which were confirmed by the participants. Thus, to ensure quality (*dependability*), results are then subjected to an audit trail of a qualitative expert in the locality, and the latter confirmed the results (themes) of the study as it was. The researcher presented the transcripts to the participants for verification of data for its truthfulness, and accuracy resulting in holistic *credibility*.

Data Analysis

The study utilized Groenewald's (2004) data explication process to have in-depth, objective description, and analysis of the driving

forces of students' choice in specializing science. The author went through the following rigorous steps in analyzing and synthesizing the transcripts; 1) transcription process, 2) delineating units of general meaning, 3) clustering units of meaning to form themes, and 4) Summarizing each interview, validating and modifying.

The author, repeatedly listened to the audio recorded interviews to internalize the participants' unique experiences. The author also outlined 122 units of general meaning out of the transcribed interviews. Initiated units of general meaning are then delineated through careful analysis of whether the responses of the participants during the interview answered and illuminated the research questions. The responses that appeared to address the objectives of the study are noted as units of relevant meaning while irrelevant and redundant units are discarded and eliminated. The author also examined each cluster on the implied essential meaning which the participants' conveyed.

Findings

Four essential themes emerged from the analysis of narratives. These themes served as a guide to the participants' responses in the study. It was then used to determine and describe the driving forces of their choice in specializing science.

Table 2. Themes generated from the analysis of narratives

Generated Themes	Selected Transcripts/Codes and Frequencies	Description of Themes
1.0 Personal Interest	1.1 He loves Science	P4,1
	1.2 He likes Science	P3,2
	1.3 Since grade school his favorite subject is Science	P1,3
	1.4 He loves Mathematics and Science	P1,14
	1.5 He likes the subject and motivated to explore	P2,24
	1.6 His favorite subject is Biology since high school	P3,26
	1.7 He has a favorite topic in Science	P4,29

1.8 She always studies Science	P4,69	• <i>Attitudes towards Science</i> of the participants enhanced their inner drive to venture in science education.
1.9 He wanted to explore other things in Science	P2,22	
1.10 He only knew 15% in the world of Science	P2,23	
1.11 He reads books on fossils and dinosaurs	P1,1-8	
1.12 She wanted to impart what she learned in Science	P2,25	
1.13 She told herself that it is still fine to take Science	P3,43	
1.14 She can relate Science to herself	P4,62	
1.15 She gets high grade in Science	P3,45	
1.16 He loves dinosaurs and read books about it	P1,9	
1.17 He searches materials with dinosaurs	P1,10	
1.18 She asks things that only Science can explain	P4,59	
1.19 She wondered the changes within her body	P4,60-65	
1.20 She develops the love for Science	P4,70	
1.21 Her Chemistry teacher conducts experiments	P4,67	
1.22 He discovers things because of experiments	P1,7	
1.23 His experiences are classifying amphibians	P2,27-28	•The exposure of the participants' to different <i>Science Experiences</i> attracts them to take Science as their specialization.
1.24 During high school Physics was introduced to him	P1,12-13	
1.25 When he studied Physics, it catches his attention	P1,16	
1.26 Physics motivated him	P4,58	
1.27 Reproductive system was introduced to them	P3,38-40	
1.28 When she took Science, she learned to enjoyed it	P1,1	
1.29 She loved Physics because it has calculations	P2,30	
1.30 He learned how the heart works	P2,31-32	
1.31 She learned the major transport system of the body	P1,120-122	
1.32 She studied how food molecules are distributed	P3,110-115	

2.0 Nature of Science	2.1	He thinks Science can develop him more	P1,4-5	<p>•Personal <i>Views in Science</i> of the participants' catch their attention to explore this field.</p> <p>•<i>Science as a Subject/field</i> itself can captured the participants' hearts.</p>
	2.2	Science helps him to discover things	P2,33	
	2.3	He can relate in Science since he is human	P4,53	
	2.4	She has greater retention because of experiments	P4,63	
	2.5	He can describe Science for it has activities	P4,54	
	2.6	The origin of human species explained by Science	P4,54-55	
	2.7	They do the hands-on activities just like Chemistry	P1,78-83	
	2.8	Science is fact	P2,34	
	2.9	Science can explain everything in the world	P4,47	
	2.10	Science can broaden her understanding	P4,57	
	2.11	It can be seen or experimented	P4,109-110	
	2.12	Science is more beautiful for it has branches	P1,17-18	
	2.13	It does not only imply living things	P3,87-90	
	2.14	He discovered that Science is everything	P2,20-21	
	2.15	"every action there is equal & opposite reaction"	P3,91-95	
	2.16	Science is special because of its the experiments	P4,97-103	
	2.17	As you can see around Science is everywhere	P4,116-119	
	2.18	Physics has Mathematics and Science	P1,104-106	
3.0 Family Influence	3.1	Her auntie decided for her to specialized in Science	P3,36	<p>•<i>Relative's Decision</i> has strong influence in the participants' career choice.</p>
	3.2	Her parents can't explain she asked on Science	P4,64	
	3.3	Her auntie concluded that Science is good for her	P3,46	
	3.4	Her auntie found; she has good grades in Science	P3,101-108	
4.0 Teacher's Impact	4.1	Her teachers always performed experiments	P4,61-68	<p>•The <i>Teacher's Competence</i> towards the subject motivated the participants to study in Science.</p>
	4.2	His Science teacher became his inspiration	P3,41-46	
	4.3	She learned Physics easily because her teacher	P4,83-86	
	4.4	She has good retention because of her teacher	P4,71-77	
	4.5	She develop to love Science because of her teacher	P1,6-11	

4.6 Her Chemistry teacher conducted experiments	P4,52	•Teacher's Teaching Strategy increase the participants interest and inspired to become good and effective Science teacher.
4.7 She can easily understand her teacher in Physics	P2,58	
4.8 Her Physics teacher was good in teaching	P1,15	
4.9 Her teacher discussed through interesting activities	P3,51	
4.10 Her strict teacher motivated her to become one	P1,37	

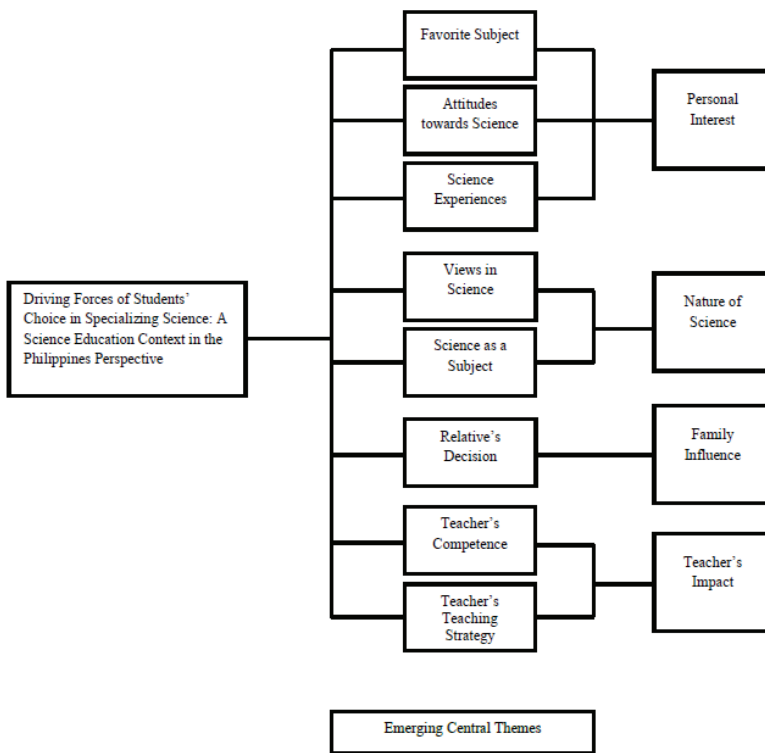


Figure 1. Themes generated from the analysis of clusters of meaning

Personal Interest

The participants' responses that science is their favorite subject and their attitude towards science develop their personal interest

in science regardless of their gender. It was inferred that this is due to their exposure in science-related activities. Their responses,

“Gikuha naku nga specialization ang science kay ganahan ku sa science sukad katung elementary pa ku” P1 [I take science as my specialization because it’s my favorite subject since grade school]

“Naa kuy paburitu nga topic sa science gikan sa biology” P2 [I have my favorite topic in science under biology]

“Ganahan ku sa physics ilabi na jud sa mga calculations” P4 [I love physics especially calculations]

The participants value science at an early age by spending time reading fiction books. They stated that this childhood activity helped them develop interest in science. They expressed,

“Sa katung higayun nga gipa ila-ila sa akua ang physics, nakuha ni ini ang akuang bug-us nga attention. Kay ang physics naa man jud math ug science nag dusu kini sa akua nga malamian sa science pa jud” P1 [The moment physics was introduced to me it captured my attention. Since physics has math and science it motivated me to love science more]

“Naay mga bagay nga ganahan naku sa science nya ug ganahan ka sa usa ka subject determinado kang mu explore ni ini” P2 [There are things that I wanted in science and if you want that subject you are determined to explore it]

“Nag gaan kug uras sa pagbasa ug pag bukad sa internet nahinungud sa mga dinosaurs ug uban pang science-related materials sa library” P4 [I spent time reading and surfing the internet on dinosaurs or science-related materials in the library]

They enjoyed their science classes because their teachers exposed them to science-related activities like experiment. They shared,

“Sang katung high school pa ku, nag buhat kug bulkan gikan sa bakyas ug gipakita sad kung unsa ang mahitabu angut sa pagbutu sang bulkan” P1 [When I was in high school, I performed how to make volcano out of clay and showed volcanic eruption]

“Na hinumduman ku ang amuang eksperimentu sa chemistry angut sa density ug na ganahan ku sa pag mekskla sa substances sama sa alcohol, langis, shampoo u pulog ug akuang gi identify asa nila ang mas бага” P2 [I remembered our experiment in chemistry on density which I enjoyed mixing the substances (alcohol, oil, shampoo, dye) and then I identified which among the substances is denser]

“Kung ang mga studyante naay mga aktibidades sa laboratory mas daku ang ilahang higayun nga magpabilin ang ilahang natun-an kay sila man jud ang naga buhat ug naga diskubre mismo” P4 [If students have laboratory activities they would have greater retention since they do the experiment and discover things by themselves]

Nature of Science

This participants' perspectives in science as a unique subject pushed them to specialize science. Participant expressed,

“Ang science maka eksplekar sa tanang bagay gikan sa hangin nga atung gina ginhawa, sa pagkaun nga atung ginakaon, ug sa mga naga ka hilitabo sa atuang palibot” P2 [Science can explain everything from

the air we breathe, food we eat, and the changes that happens around us]

Participants expressed that science is fact, an actual learning, and has branches that explains phenomenon which broaden their understanding.

“Naay kalami sa science kay dili lamang naga limit sa kabuhi, naa sad ni areas nga maka relate ku ug ini tinuud jud” P1 [There is beauty in science for it does not limit on life alone but it has areas I can relate to and it’s a factual]

They revealed that they have greater retention in science for it has laboratory experiment. Participant expressed,

“Ang science pwedi mangin actual o situational nga ihibalu ilabi na sa mga eksperimento sa laboratory nga naka tabang sa pag uswag sa akung pag sabut” P4 [Science can be an actual or situational learning particularly on its laboratory experiments which help broaden my understanding]

Participants found science as challenging subject for entails calculations which they love most. It was manifested as they excelled in science with high grades, winners in competitions and graduated as best in science. Participant expressed,

“Ganahan ku sa science tungud sa physics nga naay mga computations nga naka palambu sa akuang madalum nga panghangup kag pag analisa sa mga bagay nga nakatabang sa akua sa pagpanguna sa klase” P3 [I like science because of physics which has calculations that can enhance my critical thinking abilities on analyzing things that made me top the science class]

Family Influence

This was coined as a single theme for its uniqueness, expressed only by one participant. It revealed that it's not the parents who influenced her to specialize science instead her auntie, due to the Filipino culture "close family ties" even relatives have strong impact towards students' choice in specializing science. She conveyed,

"Sa tinuod ra, ang science dili jud naku gusto peru nahug kung science major bangud kay mau ning ganahan sa akuang Iyaan" P3 [Honestly, science is not my choice but I ended up specializing science because my auntie decided it for me]

Teacher's Impact

The participants' science teacher's engagement influenced them to specialize in the course. They attribute their teacher's strategy and competence in teaching to a good teacher, which developed their interests in the subject. One of the participants revealed that he idolized his science teacher, which enticed him to become science teacher. He expressed,

"Ang akuang mangtutudlu sa physics ninghatag nakug inspirasyon para mag specialized sa science kag mahimung isa ka mangtutudlu sa science sa umaabut nga panahon" P1 [My physics teacher inspired me to specialized science and become science teacher someday]

The teachers teaching style and strategy contributed to the development of students' interest to venture science. He expressed,

"Kusug ra nakung masabut tungud sa pamaagi sa akuang physics teacher sa pagtudlu nahanungud sa iyang kamaayu sa pagtudlu naka kuha kug dagkung

score sa test” P2 [I can grasp easily the way my physics teacher discussed for he is good in teaching of which I got high score in the test]

Others perceived a good teacher as someone who is not strict in teaching. In the case of one participant, she was inspired to specialize science when she experienced a very strict teacher and that teacher excellently delivered chemistry lessons in their class which motivated her to become a science teacher. Her response,

“Ang akwang chemistry teacher estrektu kayu nga mangurug ku sa kada klase nya. Ang iyang pagka estrehta nitabang sa paglambu sa akwang pamatasan sa pagtuon nga nagpahimu nakung mu excel sa iyahang klase. Ang iyahang pagka ekspert kag pagka bansay sa subject nihatag nakug inspirasyon sa pagkuha ug science bilang akwang specialization” P4 [My chemistry teacher was strict and I trembled every time she discussed. Her strictness developed my study habit that made me excel in her class. Her expertise and competence in the subject inspired me to take science as my specialization]

Discussion

Exploring science education is an opportunity that entails deeper understanding of the world from the lens of shaping scientific minds to flourish the human welfare. The standpoints inspired the author to determine and describe the driving forces of students’ choice in specializing science, and reciprocate its advantage to proliferate students’ interest in science education.

Learning experiences either in physics, chemistry, or biology stimulate students’ interest to specialize science. If students are determined and motivated to pursue the subject, they develop positive attitude that enhance scientific knowledge

and persistence in science (Maltese & Tai, 2011; Deci & Ryan, 2009). This positive attitude and commitment to science affects students' interaction and performance, which implies that teachers should consider proper attitude setting as essential in conditioning students' minds, integrating "hands-on" activities that scaffold student's logical and manipulative skills (Kinyota, 2013; Omondi, 2013). The author claims that students' *personal interest* and perceptions of science as their favorite subject, and their attitudes and experiences positively impact their choice in science regardless of gender.

The *nature of science* influenced students to explore science unique realm. They perceived science as an interesting topic that deals with facts and can be experimented for it has branches that explain phenomena for broader understanding. Science provides theories and principles which modern technology demands for students' knowledge utilization to advance their conceptual and theoretical understanding. Students' understanding may link to their existing knowledge, which is highly encouraged in order to have competence in science. If students choose the subject they acquire scientific skills and the positive attitudes, which are indispensable in stimulating students' interest and appreciation for science. In their interviews they see science as a challenging field with calculations which enhance their critical-thinking and problem-solving abilities (Pozo, 2010), which made them excel in the field of science. Their good grade, winner in local, regional or in the national arena of science competition, and even awards as outstanding students in science during their graduation. Moreover, students perceived science as a lucrative career since it offers potential opportunities. This is congruent to the findings of Francis (2010) and Nagy, Trautwein, Baumert, Koller, and Garrett (2011) that sciences are associated with high status; and it is still applicable through the changes of time (Omondi, 2013). Thus, the greater career opportunities a certain subject has, the greater the likelihood students will prefer to enroll in it (Ackerman & Gross, 2009).

Family influence students' choice in specializing in science. In the students' interview, they claim that their parents or relatives are influential to their choices than guidance counselors or teachers. The author inferred that because students have direct connections with parents and relatives due to the Filipino culture of "close family ties". In fact, Mabula (2012) believed that parents' and relatives' level of education, knowledge about work, beliefs, and attitude unconsciously influence students' career preferences. Families with high regard for science tend to choose a scientific career for their students, and oftentimes ends up following their parents' decisions. It was gleaned that because of the belief that "parents know best", students decision-making are influenced mainly by their parents' perceptions and interests in life, specifically the career they accomplished in their personal life. The students also revealed that they are most likely to enroll in science whenever they seek their parents' advice which implied that parents should ensure that they guide students, particularly in career decision. Parents' support for their students' career choices makes them feel confident and become successful in their chosen professional life in the future (Kinyota, 2013; Mabula, 2012; Okeke, 2009). Therefore, to encourage more students in science education, the school may consider involving parents in career activities discussing with them the benefits and opportunities which science education offers.

Teachers play a crucial role in stirring up students' choice in science (Wilhelm, 2010). The teacher's competence and teaching strategies are attributed to *teacher's impact* which motivate students towards science education (Babad & Tayeb, 2009). Students find science class interesting and exciting if it is delivered by competent teachers who are enthusiastic, well-spoken, and knowledgeable. Hence, teacher's intervention is frequently cited as one of the most important attribute in maintaining students' interests in the classroom (Sandoval & Harven 2011). Moreover, the teachers' lecturing style is valuable as the quality of the content (Curran & Rosen, 2009). Teachers should therefore disseminate strategies catering students' needs

and preferences to motivate, excite, and make them interested to learn science. If students are taught in a manner which they prefer, students' comfort level and willingness to learn increases. To make it responsive, teachers may integrate life-like situation lessons and are encouraged to prepare engaging, interesting, and exciting science classes to stimulate students' interest in science education. Concrete materials with the principles of "understanding-by-design" significantly offer students the opportunity to learn first-hand experiences other than abstract concepts. This strategy can enhance students' science conceptual and theoretical understanding to improve students' knowledge, critical-thinking abilities, and problem-solving skills which are effective approaches that bridge students' meaningful science learning experiences.

Implications of the Study

The experiences of students in specializing science are primarily driven by personal interest, nature of science, family influence, and the teacher's impact. These driving forces interweave to lean on science for students' career choice, which can be manipulated and reciprocated to make it valuable in the crafting of innovative policies and reforms to the existing practices and to inspire students' in science-related careers.

The success of science educational reform depends on teachers as the main agents in transforming the underpinning theories in curricular reforms into actual practice. They have valuable part not only in cultivating students' interest in science but also in the school system in shaping scientifically literate individuals of the country. This development requires science teachers to be more innovative and creative to inflict good bedrock of science principles to students' as they adapt to the diverse teaching of science in the contemporary time. Moreover, teachers will be reflective of re-tooling their practices and strategies in teaching which anchor on students' needs through advancing their competence to deliver meaningful science

learning experiences. The exposure of students in science-related activities at an early age develop their interest either through manipulative or visual presentation including television shows. Thus, policy-makers, educators and other stakeholders will be enlightened on how to improve the school system by discovering and devising mechanisms effective for outcomes-based science education curriculum. The mechanism will serve as an eye opener to the Department of Education (DepEd) to strengthen its implementation of the science investigatory project (SIP) in the basic education. Apparently, SIP has been proven effective in augmenting students' inquisitive and inventive minds which develop them to become scientists or science experts of the country. Moreover, the latter will be guided with the perspective of reviving "*Sineskwela*" a Filipino children's television series which was aired in the late 90's that educate and sparks students' engagement in science at an early age. The school may benchmark modifying the school-to-school career campaign practice by involving parents in the process for they significantly influence and motivate students' choices in science careers.

The Philippines as a developing country needs a scientifically literate society to develop robust manpower necessary to compete in the global economy. This vision will become possible if students are more engaged in science careers. However, the government's effort in improving science education is limited to scholarships alone. It is imperative to provide radical solutions and intensive reforms to address the demands of science experts who are the backbone of the country's economy.

Since *personal interest, nature of science, family influence*, and the *teacher's impact* play vital role in students' choice in specializing science, it is recommended to reciprocate its advantage. First, academic institutions may revisit and review its science curriculum and consider the identified driving forces advantage to attract students in science education. Second, provide state-of-the-art laboratory facilities for students "hands-on" science learning activities.

Third, strengthen teachers' competence by providing supports to their professional advancement to harness their mastery and competence towards the subject. Lastly, provide programs involving parents in the school's career campaign to influence students' choice in science careers.

The study is purely qualitative utilizing four participants, and results were solely dependent on the participants' responses and experiences. The scarcity of participants limits the results. Future researchers may delve deeper into the qualitative-quantitative research to further validate the derived driving forces on students' choice in specializing science. A greater number of representatives may be considered ideally from the three major regions to determine if the identified driving forces were evident across the country.

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