

# Mathematics a Phenomenal Preparation, an Excellence Builder

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**Abstract:-** Informants of Siargao Island were investigated to source out a phenomena that described the common lived experiences of mathematicians. Study employs a phenomenological research on Descriptive Phenomenology which utilized purposive sampling, in-depth interview, and analyzed data under Giorgi's patterns. Findings revealed that 35 concepts were formulated from 157 significant meaning units, and were categorized into 13 propositions, and 4 themes were extracted. Findings, concluded that mathematics prepares anyone to be self-reflective, dependable, intelligent, self-reliant and trustworthy. Proven ones that mathematics wizards are self-made individuals, they worked for excellence. Insights are brought forward that this study has been explored to supports aspirant mathematicians, extended comprehensions against mathematics complexes and paradoxes, enlightened or lights up educational curriculum makers, provides mathematics teachers and trainers ample truths about the essence of being a mathematics wizard: their habits, beliefs and aspirations.

**Keywords:-** Mathematics, Mathematicians, Lived-Experiences, Excellence, Siargao Island.

## I. INTRODUCTION

In ancient civilizations, mathematics was perceived a potential power of man's abstraction, this word comes from a Greek terminology *mathemata*, which indicates any study or instruction and originated with the practical problems of counting and numbers (Burton, 2006). It is a powerful tool that man understands the language of other fields (Laranjo, 1997). A mathematician is a person whose primary area of study is mathematics. He or she is concerned with logic, space, transformations, numbers and ideas encompassing these concepts. His/her field of interest covers a breadth of topics in mathematics during his/her undergraduate education, and then proceed to specialize a topic at the graduate level (Hardy, 1992).

Mathematics skills as defined by the Organization for Economic Cooperation and Development (OECD 2003) consist of the "individual's capacity to identify and understand the role that mathematics plays in the world, to make well-founded judgments, and to use and engage with mathematics in ways that meet the needs of the individual's life as a constructive, concerned and reflective citizen." These abilities posed an important role in the society; thus, there is increased demand for mathematically literate workers who are needed to meet the economic needs of the

world (NCTM 1998) as it is also stressed by Falkner, Levi & Carpenter (1999).

Mathematics wizards are expert. They are recognized a reliable source of technique or skill whose judgments are accorded with authority and status by their peers, even by the public. They are persons with extensive and special knowledge or ability beyond that of an average person. Historically, they are considered profound thinker who are distinguished of their wisdom and sound judgment (Sweller, Mawer & Ward, 1983). They have the "ability to rearrange or construct a higher dimension of creativity", thereby developing more abstract perspectives of concepts and performances (Chase & Simon, 1973). In fact, on the study of Ericsson & Staszewski (1989), mathematics enthusiasts can mentally solve 2 x 5 digit multiplication problems in 25 seconds, this tells that Mathematics wizards are achiever. They have positive attitude to all their undertakings, diligent in dealing the problem positively, and strong have belief in self. They do not pay attention to negative remarks and criticism as they work toward their dreams. They have a strong sense of purpose that comes from focusing on a goal. Consequently, they possess ability to plan and keep on learning. To them, learning is an ongoing process that never stops, even after acquiring a diploma, thereby, maximizing their potential and worth through polishing their current skills and learning new ones. As achievers, mathematics wizards are readers, they learn from the masters through and associating with role models and from their mistakes. They are not afraid to ask questions in fear of looking stupid. They are communicators, involved with people and groups who share the same vision. Also, they are risk takers who possess the virtues of patience and persistence for they believe that success never happens overnight and that it takes consistent action to achieve a goal. Hence, they have vision and imagination. They use their imaginations to look for ways to do things better, improve relationships and solve problems.

The abovementioned constructs prompted the researcher to uncover the lived experiences of the mathematics wizards of Siargao Island. They serve as the main resource whereby the qualities a mathematics wizard can be extracted from. Thus, this study investigated the lived experiences of mathematics wizards of Siargao Island through a descriptive phenomenology which looked into their qualitative explanation.

### ➤ *Conceptual Framework of the Study*

Phenomenology was employed in this study. It entails interpretation of human experience in which phenomena are

examined and clarified through the human situations, events and experiences as they spontaneously occur in the course of daily life (Von Eckartsberg, 1998). As such, it is concerned with uncovering themes that represent basic units of common understanding about the phenomenon and whose primary objective is the direct investigation and description of phenomena as consciously experienced, without theories about their causal explanation by Spiegelberg (1975). Since this study aspires to capture the lived experiences of mathematics wizards, phenomenology is deemed a useful tool for investigating the desired phenomenon (Schiro & Lawson, 2004). This technique or method is defined as an “attempt to intuit, analyze, and describe the data of direct experience in a fresh and systematic manner” (Speziale, Streubert & Carpenter, 2011). Therefore, existence can be approached and studied as one phenomenon among others is an essential structure such that phenomenology is concerned with uncovering themes that represent the basic unit of common understanding about phenomena, which are lived experiences.

Lowes and Prowse (2001) affirmed that researchers engaged in phenomenology consider the assumptions of their chosen method of inquiry whether those assumptions are consistent with their own views and ensure that the methods reflect those assumptions in the conduct of the research.

As research method, descriptive phenomenology undergoes three essential steps Sherrod, (2006), namely intuiting, analyzing and describing. Intuiting is uncovering the accurate interpretation of what is meant in the description of the phenomenon being studied; hence, requires first dwelling with the data. Dwelling with the data requires time, commitment to authenticity and to the informants (Munhall & Boyd, 2001). Analyzing requires identifying the essence of the phenomenon and how the data

are presented as pointed out by Gibbs, (2018). Describing this aims to understand the various perspective and experience of the people (Marton, 1981). Hence, the authors believed that this methods guides even the novice researcher and gives a researcher an opportunity to determine and understand the thru essence of research.

Figure 1 illustrates the flow of the study in relation to the phenomenological approach as utilized in this study. Two divisions of the plane were considered. The abstract level indicates the theoretical explanation of the investigated phenomenon while the concrete level shows the actual explanation of the investigation.

The concrete level started on the data gathering process of the researcher from the informants lived experiences. On this stage, the researcher conducted in depth individual interview. It was done either one-to-one interview, a telephone interview or online interview with the informants in order to collect the needed information about their lived experiences as mathematics wizards.

Based from the gathered information, the lived experiences of the informants as mathematics wizard were uncovered. The uncovered lived experiences of the informants were revealed and reflected in the results and discussion of the findings. The double arrowhead implied that if the phenomenon is not yet known, the researcher did a working back checking to be able to describe well the phenomenon.

The literature of the study influenced the researcher to light up in the process of the study as the prior knowledge. It had helped a lot in generating concepts on how to scientifically process the lived experiences of the informants as mathematics wizards.

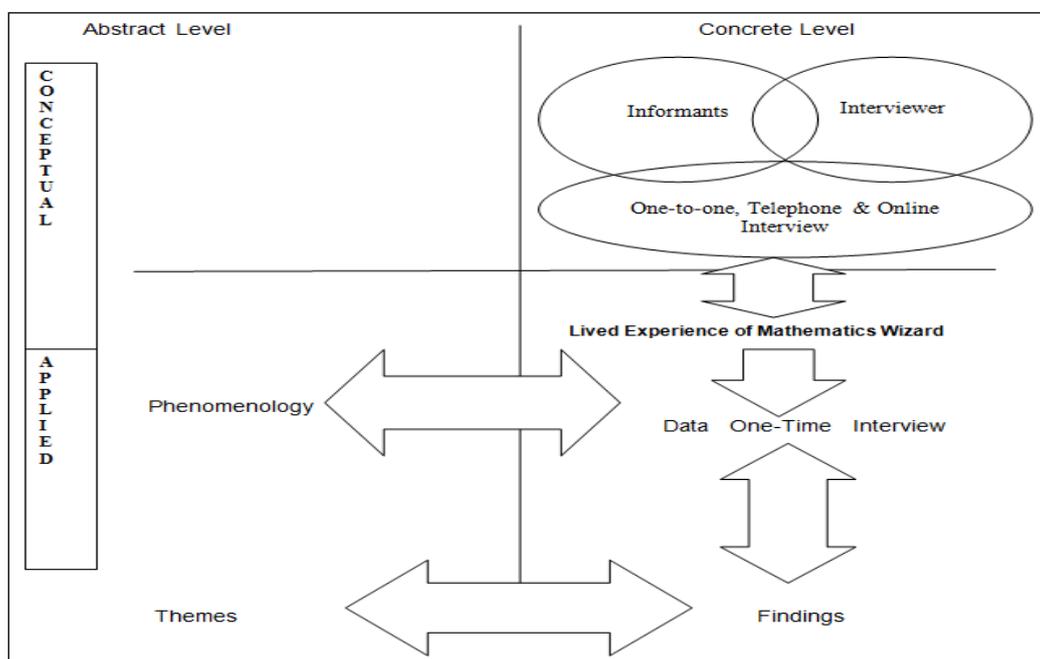


Fig 1:- Flow of the Study

➤ *Purpose of the Study*

This study is a descriptive exploration of the lived experiences of the mathematics wizards.

## II. METHODOLOGY

This chapter presents the research design, informants, instruments, data gathering techniques, and data analysis used in the study patterned by Giorgi, A. P., & Giorgi, B. M. (2003) methodology.

➤ *Research Design*

This study was undertaken within a qualitative framework, specifically drawing on understandings of phenomenology. Specifically, it utilized Descriptive Phenomenological Approach in describing the phenomenon of the lived experiences of the informants. This approach was deemed appropriate because this paper attempted to explore the experiences of the informants as mathematics wizard; hence, the strategy was highly inductive. This emergent design is necessary because it gives the researcher the flexibility to dig deeper into the setting, thereby, arriving at better understanding of the extant phenomenon drawn from the informants. It begins with expression and description by the informants of their lived experiences so that phenomenal story, which Giorgi calls “life-text”, can be created. Then, using the three essentials steps the intuiting, analyzing and describing to complete the studies.

➤ *Informants*

Since statistics are of no concern to phenomenological methods choosing of informants was purposive, such that the investigated phenomenon is relatively salient to the group. This was done in order to gain a more detailed picture of the phenomenon. Choosing an informants was based from the knowledge of the researcher and their mentors regarding the informants’ history of winning in various mathematical competitions (Kumar, Stern & Anderson, 1993). Informants took their secondary education in the Division of Siargao, Surigao del Norte and graduated last March 2009. At the moment, they were on their tertiary studies in the second year level, two of them took Bachelor in Secondary Education major in mathematics at Siarago Island Institute of Technology, Dapa, Surigao del Norte and Surigao del Sur State University, Cantilan, Surigao del Sur, respectively. The two other informants took up Bachelor of Science in Mechanical Engineering and Bachelor of Science in Civil Engineering, respectively, at Mindanao State University, while the other one was enrolled in Bachelor of Science in Accountancy at St. Paul University Surigao, Surigao City. Their ages range from 18 to 21 years old. All of them are consistent academic scholars in their college education. They joined and won various mathematics competitions representing their colleges or universities.

➤ *Instrument*

The data sources for the study include interview and documentary evidences. The Interview Guide was validated by two experts in the field of qualitative research, while the documentary evidences were secured from the informants to ensure that they met the criteria set for the study.

➤ *Data Gathering Procedure*

The researcher made various inquiries during division meetings among mathematics teachers as to whom they can recommend to be her informant given the research criteria. Eight students were named; however, only five were available for the interview. Conduct of the interview was mimicked from the suggestion of Qu & Dumay, (2011). Firstly, a phenomenon was identified by asking the grand tour question: “Tell me about your experiences as a mathematics wizard.” Secondly, the researcher bracketed out her own experiences as a mathematics enthusiast by keeping to herself that she knows nothing about the informants’ backgrounds, specifically regarding their feelings and insights. Thirdly, data were secured from the informants using in-depth interview, such that series of follow-up questions based from the informants’ responses on the research question. Of the five informants, three were interviewed one-on-one. The researcher went to their respective boarding houses. A letter of consent addressed to the informants was served personally by the researcher, and the Informant’s Information Sheet was introduced and filled up by them. On the same day, in-depth interview was done. One of the informants was interviewed by phone. Both the letter of consent and information sheet were sent electronically to him. After the letter of consent was signed by the said informant, and filled information sheet, the researcher set a date for a telephone interview. Interview with the other informant was done through chat and social network communication. The researcher wrote him through an email introducing herself and her intentions. Information sheet and letter of consent were likewise downloaded through social network. After the reply was sent by the informant, the researcher set an online interview with him. Responses on the one-on-one interview were tape recorded, while the phone and online interviews were transcribed immediately. Tape recorded interview responses were transcribed personally by the researcher, such that the informants were coded V, W, X, Y and Z.

➤ *Data Analysis*

Data gathered from the informants were analyzed following descriptive phenomenology. In keeping with phenomenological research, paying a critical attention on the acknowledgment and bracketing of the researcher’s theoretical understandings of lived experiences of mathematics wizard was secured by the researcher. After a verbatim transcription of the interview protocols, four-step methodology was followed: *Reading the entire descriptions to get the sense of the whole statement by each informant.* The researcher read and re-read the entire descriptions in order to gain a sense of the whole of the phenomenon keeping in mind of the phenomenological perspective. Such holistic understandings are important in determining how the parts are constituted. *Determination of structure.* This step involved synthesizing the insights within the meaning units into a consistent description of a structure of the phenomenon so that a situated or specific description was written. This involved the process of free imaginative variation on the transformed meaning units to find what is truly essential about the phenomena. The final part of this step involved carefully describing the most invariant

belonging to the experience, which is the general structure or statement (Elo, & Kyngäs, 2008). Identification of emergent themes, which led to the identification and explication of the global theme, was done. It was made possible through finding the commonality in human experiences of the informants. This step will be presented on Chapter 3 the findings of the result. Then, the researcher systematize the extraction of the lowest-order premises evident in the text, which was labeled *concepts*, the concepts were grouped together to summarize more abstract principles, termed as *categories*; and the themes encapsulating the principal metaphor in the text as a whole, referred in this study as *global theme*. Figure 2 below showed the flowchart of the study that guides the researcher on her quest to describe the lived experiences of mathematics wizard.

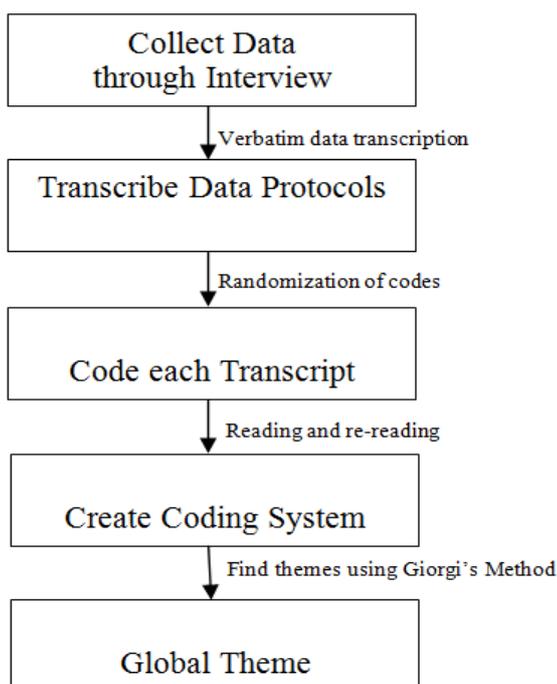


Fig 2:- Flowchart of the Procedures in the Empirical Phase

### III. RESULTS AND DISCUSSION

This chapter presents the findings and discussion of this study. Results of the analysis offer insights about the lived experiences of the informants as mathematics wizards synthesized through a matrix showing the informant's lived experiences. *Lived Experiences of the Informants* phenomenological research methodology served as basis in the analysis of the data derived from informants involving four key steps. All transcriptions were read many times by the researcher in order for her to be immersed with the informants' feelings. Significant meaning units were extracted from interview transcripts salient to the desired research phenomena. Concepts were constructed from these psychological meaning units and were arranged into categories which then evolved into themes. Results were incorporated into a rich and exhaustive description of the informants' lived experience. From the interview transcripts, 157 significant meaning units were extracted

which evolved into the development of 157 psychological meanings units reflecting the lived experiences of the informants. From these psychological meaning units 35 concepts were drawn. The said concepts describe explicitly the experiences of the informants during their stay in high school and college as regards preparation and participation in mathematics competitions. Also, the concepts show the personal struggles of the informants in their daily undertakings as students of poor families, their lifetime desires, and their attitudes towards schooling and work. The concepts explicated the inherent values and attitudes of the informants. As can be perceived, they are individuals who have positive outlook in life despite financial difficulties. Moreover, they have strong sense of personal commitment to their family as their main source of inspiration. It can also be perceived that the informants have remarkable attitude towards mathematics and schooling, and are trusted personalities in class. It can be surmised that the informants' mathematical skills are greatly enhanced by exposing them to routine and non-routine mathematical problems, which are brought about by their school who gave them special training on mathematics prior to their participation in different mathematical activities and competitions. Because of these they are used to study in advance; hence, independent becomes a habit for them. Likewise, their fervor in learning mathematics is heightened. As a result, the informants become more passionate mathematics learners and are well-disposed to learning subjects other than mathematics. In fact, they joined academic competitions other than mathematics. Consequently, the expectations and motivations of the informants' family, mentors and peers propelled them to do even better in order to bring beacon for the family, school and the division that they represent. Hence, winning in the competitions boosted them, and made them a more trusted fellow in school. Their teachers allowed them to handle a class in their teachers' absence and became tutors to their siblings, classmates and friends without monetary rewards. Also, their representation of the school and division allowed them to travel to different places other than Siargao Island, meet other people, and became exposed to the culture of other places in the region. This allows them to become compassionate, more sociable, and resilient. On the other hand, emotional strains and tight financial needs bother the informants. These experiences worry them during the competitions. However, their strong faith in God, Divine Providence, and strong family orientation moved them to do even better so that their families can be economically secured in the future. In other words, the reason for their academic efforts and future careers are meant to uplift their families from the bondage of poverty.

#### ➤ *Poverty.*

A mathematics wizard has an exceptional skill in mathematics. It is a God-given gift that is innate with him. Accordingly, he exhibits sound analytical skill and an independent problem solver. Being a mathematics wizard, he learns by heart the mathematics concepts because he finds this subject interesting and finds joy in every activity and competition that he attends to. Thus, as a mathematics wizard, he is a passionate learner. Furthermore, a

mathematics wizard works for perfection. For this reason, he strives more to correct his failures, and diligent in all his undertakings. For him, success is a product of determination. Despite financial stress, he manages to succeed in all endeavors, and considers poverty as a motivation for excelling in academics. Nonetheless, he is more challenged in solving non-routine mathematical problems. He is an intuitive thinker. He can anticipate the flow of the lesson in mathematics and he prepares himself in advance with proper time management. As a result, a mathematics wizard is confident in attending his class and participating in different competitions because he is well prepared. Thus, it makes him become a self-motivated person. Excerpts from the informants' transcripts should show these innate characteristics. On the other hand, a mathematics wizard is God-fearing. This virtue makes him a strong individual. This virtue enables him to succeed despite every difficulties and poverty.

➤ *Family, and School Support.*

A mathematics wizard is influenced, inspired, motivated and enhanced by his external environment, such as school, family, peers and mentors. Accordingly, these entities are important aspects in honing his innate skills in mathematics. His mathematical skills are boosted through exposing him to a variety of mathematical problems and consistently participating in different competitions. Consequently, he is trained prior to the competition by his school. This life experience of the mathematics wizards shows the importance of school in nurturing their skills of mathematics. Hence, school support is an important factor that helps a mathematics wizard gained more confidence and garnered awards for the school and for the division. Also, the mentor's kindness and generosity disposed the informants during competitions. Moreover, the informants' peers and family have significantly influenced the wizards' passion for learning mathematics. Their families and friends are their sources of inspiration. In fact, their college degrees are dedicated to them. Moreover, a mathematics wizard also gained self confidence because of the appreciation of the people with in his vicinity especially when he is recognized and admired as a wizard.

➤ *Positive Self-Image.*

Belief in oneself tells about the lives of the informants. A mathematics wizard considers winning in different mathematics competitions an unforgettable experience. They received various awards from different competitions, other than mathematics, and earned an image of being a campus idol. More so, receiving monetary rewards and other awards gave them a feeling of fulfillment and satisfaction. Consequently, their experience being a winner boost their self-concept; thereby, becoming more compassionate and trustworthy. These virtues posit that the mathematics wizards share their lives, giftedness, and resources with

others. They are naturally compassionate. A mathematics wizard is generous of his time and talent with his peers. Sharing their expertise in mathematics and allied subjects become a habit. They are humble enough to share and teach mathematics with those who have difficulties understanding mathematical concepts. They become a friend to everybody. They are trustworthy.

➤ *Co-Curricular Experiences.*

A mathematics wizard is an excellent individual. Accordingly, he is a consistent winner in different competitions in mathematics. He has strong belief of succeeding in every endeavor that he is involved with. From this attitude, it is surmised that a mathematics wizard is an optimistic individual. He has positive outlook in life, and has a proactive way of dealing with others. On the other hand, a mathematics contender in the division and regional competitions, their experience has offered them opportunity to travel to other places and a chance to mingle with other people. Also, their mathematics training and experiences in many competitions made them see the real-life significance of mathematics. This have influenced likewise on the choice of course that they are taking in college. As their cup of tea, they are all taking mathematics related courses.

➤ *Interrelatedness of the Factors that Affects a Mathematics Wizards.*

The model on Figure 3 shows the interconnections of the four identified factors, such that the global theme has immersed: *Mathematics wizards are self-made individuals.* They are nurtured by the factors that influenced his totality as a person. The interactions of both factors have greatly determined their identity distinct from an average individual. Each factor is interrelated to the other. Interrelated in the sense that every factor is affected by each other or being influenced by one another. Interconnected because each factor is associated to the other factors. The harmony of these factors evolved into a fact that a mathematics wizard is a self-made individual, who is strong and a well-equipped. They are capable to make conscious decisions. They are moved towards specific life goal, and take charge of their own development. They are looking for ideas, skills and mental tools to make them better because they want to be the best they can be. The inputs of the people in their surroundings created them as truly effective persons. Mathematics wizards are the persons who can firmly in control of their life. They can make judgments on their own, rather than what other people think of them. They serve as models, whereby their mentors and family regard them as truly motivated individuals with seemingly holistic self-concept or self-image. They consistently work towards their life goals, and are not easily distracted with false accusations and mediocrity. Also, they are not susceptible to peer pressure. Their self-interest pushed them to work towards excellence. This made them undeniably self-made.

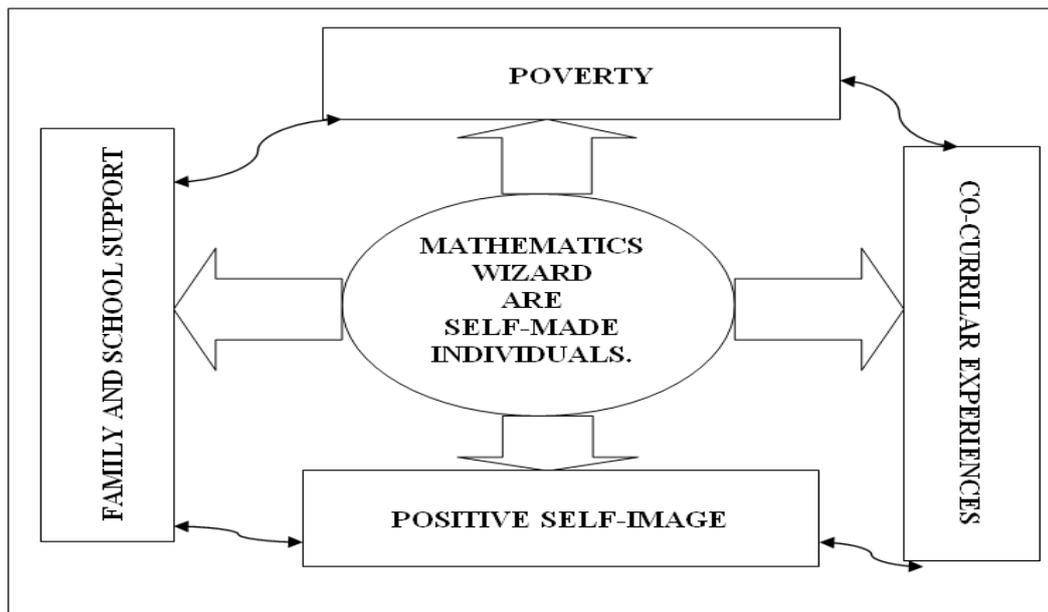


Fig 3:- A Model Showing the Informant's Lived Experiences

#### IV. SUMMARY

This study investigated the lived experiences of the mathematics wizards of Siargao Island. The main objective of this paper was to describe the phenomenon common to the informants as mathematics wizards. A phenomenological research, it utilized the framework of Descriptive Phenomenology. Five informants were included in the study. They were determined using purposive sampling. Data were gathered through in-depth interview method. Analysis of data was patterned from the Giorgi's four – step methodology.

#### V. FINDINGS

Based from the analysis of qualitative data, 35 concepts were formulated from 157 significant meaning units, and the concepts were categorized into 13 propositions, namely:

1. Mathematical skills of the informants are enhanced by exposing them to a variety of mathematical problems through attending to training in problem solving, independent study, and participating in mathematics competitions;
2. Mathematics wizards are greatly influenced by the expectations and motivations of their mentors, family and peers;
3. Their experiences as a mathematics wizard influenced their chosen college degrees;
4. Their experiences as mathematics wizards socialized them more;
5. Mathematics wizards are excellent individual;
6. The informants are passionate in learning mathematics;
7. Mathematics wizards have strong faith in God;
8. Emotional strains and tight financial needs disturbed mathematics wizards in their studies;
9. Being a mathematics wizard is God-given. It is an innate skill;
10. Mathematics wizards are well-disposed to learning;

11. Wining in different competitions boosts the informants;
12. Mathematics wizards are compassionate;
13. Mathematics wizards are trusted persons.

From these categories, 4 themes were extracted:

1. School support, mentors, family and peers are important factors that influenced mathematics wizards;
2. Mathematics wizard are self-reliant;
3. Despite financial dilemmas, mathematics wizards are self-motivated learner and are pious individual;
4. Mathematics wizards have strong belief in oneself and a trustworthy.

Lumped together, these themes were organized into a global theme which resulted to a fact that mathematics wizards are self-made individuals.

#### VI. CONCLUSION

Based from the findings of the study, it is concluded that mathematics wizards are independent learners, assets of their school and family, self-reflective, dependable, intelligent and motivated. They work towards excellence, and are focused towards their life goals. They are simple individuals, who considered poverty as a moving force for doing even better for the good of their family and the community that they serve.

##### ➤ Implication

Based from the findings and conclusions, this study illumined new insights about the phenomena of mathematics wizard as follows: *First*, to supports aspirant mathematics wizards and become insights to those who find mathematics complex. *Second*, to lights up educational curriculum maker in their planning for effective mathematics program for the gifted. And *last*, to provide mathematics teachers and trainers ample truths about the essence of being a mathematics wizard: their habits, beliefs and aspirations.

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