

The Lived Experiences of the Low Performing Students of Bachelor of Industrial Technology of Samar State University in Making Portfolio in Mathematics

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Abstract

This study used phenomenological approach in exploring the lived experiences of Bachelor of Industrial Technology student in making portfolio in their mathematics subject in Samar State University. Ten (10) students participated in the study. Participants are Bachelor of industrial Technology second year student of Samar State University for the school year 2016 - 2017; From the data analyses, three major themed emerged: (1) No interest in making portfolio; (2) Developed Interest in Making Portfolio in Mathematics, and (3) Usefulness of Portfolio Making in Mathematics. The result suggest that these student participants experienced no interest in making portfolio because of some factors such as learning difficulties in mathematics, teacher factor in the past and their previous unfavorable experiences in math but because of their desire to achieve their goal and dreams to finish their studies they try to break their learning difficulties by making portfolio in mathematics and be motivated to make the requirement to pass the subject. Their lived experiences can encourage and inspired other low performing students to pursue their education despite of the challenges.

Keywords: Low performing students, Portfolio Making, Tech. Voc. Students, Mathematics, Low Performing

Introduction

Mathematics is considered the mother of all learning in both arts and sciences. It is essential in almost every field: measurement in fashion, angles in sports, technology and economics. This perspective on Mathematics has gained more attention with the rapid advances of information and communication. Mathematics is not just computation but a tool for understanding structures, relationships and patterns to produce solutions for complex real life problems. Mathematics is a necessity for people of all ages to be successful in life. Despite the usefulness of mathematics in daily life, there are factors that adversely affect the students' ability to understand and apply mathematics concepts.

Hott et al. (2014) Council for Learning Disabilities (A&M University & Fairleigh Dickinson University, Texas) on their article; the Strategies and Interventions to Support Students with Mathematics Disabilities states in the absence of intensive instruction and intervention, students with mathematics difficulties and disabilities lag significantly behind their peers (Jitendra et al., 2013; Sayeski & Paulsen, 2010). Conservative estimates indicate that 25% to 35% of students struggle with mathematics knowledge and application skills in general education classrooms,

indicating the presence of mathematics difficulty (Mazzocco, 2007). Additionally, 5% to 8% of all school--age students has such significant deficits that impact their ability to solve computation and/or application problems that they require special education services or some modified instruction strategies such as modules and making portfolio (Geary, 2004).

The study of Tarzimah Tambychik et al. (2010) In Malaysia, like many other countries, problem solving is one of major aspect in mathematics curriculum which required students to apply and to integrate many mathematical concepts and skills as well as making decision. However, students were reported to have difficulties in mathematics problem solving study concludes that students faced difficulties in mathematic problem solving due to incompetency in acquiring many mathematics skills and lacking in cognitive abilities of learning. Information skill was found to be the most critical mathematics skills. Although students acquired other mathematics skills, without the transfer of information skill, they could not understand and make effective connection of the information in the problems. Pallavi Amitava Banerjee(2016)in his systematic review of factors linked to poor academic performance of disadvantaged students in science and math in Victoria, University results suggest major factors linking deprivation to underachievement can be thematically categorized into a lack of positive environment and support. Generally, the majority of the students did not acquire this skill utterly. Cognitive abilities in learning such as the ability to recall memorize and perceive influence the efficiency of problem-solving.

Difficulty in mathematics skills experienced by students is a challenge for students to overcome. In adequate language skill, information skill and in mastery of number fact skill inhibits the efficiency of problem solving process. These lacking, result in uncertainty, confusion and inaccuracy in the decision making and making connection among information. These would lead to errors in mathematics problem-solving. Moreover, facts recall, was found to be difficult during making meaningful connection in the problems and could influence the efficiency of each phase in problem-solving. The inability to concentrate during the process of problem solving also may result in missing of the third phase (*confirmation of answer*) in the problem-solving. This phase was not seen as essential in the process of problem-solving among students. Further research to analyze the above hypothesis should be carried out. (National Council of Mathematics Teachers, Florida USA, 2013)

This study implies that, students' difficulties in problem-solving might occur at any phases. In fact it might be caused by a deficiency in any of the skills either independently or cumulatively. The understanding of the difficulties faced by students in any particular area and phase is the strategy to respond to this issue. Based on the understandings, it could provide a guide line for teachers as well as researchers to plan better approaches and effective teaching methods. Development of diagnostic instruments, modules and approaches were essential to assist the students which will result in more meaningful teaching and learning process.

Leongson (2003) reveals that Pilipino students excel in knowledge acquisition but fare considerably low in lessons requiring higher order thinking skills. This disappointing condition is evident in the performance of students in national and international surveys on mathematics and science competencies. Performance of pre-service teachers and mathematics teachers in the Professional Board Examination reveals the same picture of poor competencies (Philippine Daily Inquirer, 1986; Ibe,1995). The Third International Mathematical Science Study (TIMMS,2000) examined patterns of students achievement in mathematics and found out that the school effectiveness and teachers competency impact learning and promote higher level of achievements (<http://www.research.acer.edu.au/cgi.viewcontent.cgi>). The quality of instruction

and effective instructional design are necessary to alleviate problems related to teaching and learning mathematics (Dursun& Dede,2004).

College students are not exempted from the problem in learning and mastering mathematics. The study conducted by Daga & Tenedero (2015) Identification of Difficulties of Students in Industrial Mathematics: Springboard for Development of Modular Instruction reveals the Bachelor of Science in Industrial Technology students of Samar State University encountered difficulty in understanding and visualizing the situation being described in all learning areas in both conceptual and computational/problem solving in Industrial Mathematics subject. Hence, it is strongly recommended to address the difficulties faced by the participants. According to Singha, et. Al, (2012) teacher should develop positive and good behavior relationship towards the students and stress classroom activities that involve active teaching-learning process and participation. Moreover, teachers should use modified, simple and interesting methods to teach mathematics such as portfolio making and by taking examples from real and daily life situations. A remedial instruction is badly needed especially on topics where students find very difficult.

The study of Daga, Mendano&Abaincia (2014) learning difficulty of Tech. Voc. Students in physics content subjects reveals that Technical Vocational students of Samar State University(SSU) encountered difficulty understanding conceptually on Physics content subject specifically on composition and resolution of vectors. Moreover, their difficulties encountered were under computational skill /problem solving in all mechanics and heat topics. Results of the study suggested the need to address the difficulties especially on the contents faced by the participants very difficult. In such manner, Sweller (1994), on his cognitive load theory stated that snags on learning and problem solving difficulty can be worked out through instructional design. This implied that teachers teaching physics should be innovative enough in designing instructions that would encourage maximum learning from the students both conceptual and computational skill. A remedial instruction is needed especially on topics where students performed very low. According to Ambrose (2004), tutorial activities are very advantageous in enhancing student comprehension because it provides them the challenge and resolve their wrong perception and intuition on physics content. Designed educational media, interactive learning materials were significant tool in learning physics concept, likewise physics representation in the use of models, diagrams, and graphs are means in understanding physics worded problems (Squire, 2004). Nevertheless, multiple interventions conducted in any forms expectedly would increase students' achievement level, in general overcome learning difficulties in physics content subject.

Finally, the teacher who is teaching mathematics in the tertiary level should have the insight on how to modify or improve the teaching-learning situations through a wise selection of objectives, contents and activities to acquire the ability to supplement the teaching methods and techniques that are needed in relation to the abilities and potentialities of the students. Thus, the researcher determined a teaching learning strategy the portfolio making of the students in mathematics(trigonometry) subject in order to cater to the needs of both fast and slow learners and be able help them to cope with the modernization of the global competition in the market.

Methodology

Research Design

This qualitative study utilized phenomenological approach. It aimed to investigate the lived experience of low performing Bachelor of Industrial Technology students in making portfolio in mathematics (trigonometry). Qualitative research study according to Mills and Birks (2014) "aimed to examine phenomena that impact on the lived reality of individuals or groups in

a particular cultural or social context.” Phenomenology aimed to accurately describe the phenomenon without a pre-existing knowledge to a framework, but remaining truth to the facts (Groenewald, 2004). More so, using a qualitative research, the researcher would be able to connect with their participants and to see the world from their viewpoints (Corbin & Strauss, 2015). The researcher found this method most applicable to the inquiry in order to provide a comprehensive analysis on the lived experiences of Bachelor of Industrial Technology student in making portfolio in mathematics.

Participants

Participants of the study were identified using purposive sampling. Using purposive sampling, the researcher can choose their participants that will be fit for the study (Dever & Frankel, 2000). Ten (10) Bachelor of Industrial Technology students participated in the study. Participants are students under the math 213 (trigonometry) classes and make portfolio as part of the assessment tool in trigonometry for the midterm period.

Data Collection

In gathering the pertinent data for the study, a semi-structured interview was used in collecting data. This type of interview was the most familiar strategy in collecting qualitative data (Bloom & Crabtree, 2006), which helped the researcher to obtain all the necessary information needed and to allow the researchers to ask follow-up questions for clarification. The content of the interview guide were validated by three professionals who were expert in the field of Mathematics. The researcher also provided an agreement that included obtaining informed consent, ensured confidentiality, time and place commitments, permission to record and publish, delineating the ethical principles of research. As to data storing methods, the researcher used note taking and dialogic form interview to reach deeper the responses of the respondents.

Data Analysis

In the phenomenological analysis, the following steps utilized in analyzing the data phenomenologically were adopted from Hycner’s (1985) process. These steps include the following: 1) bracketing and phenomenological reduction; 2) listening to the interview for a sense of the whole; 3) delineating units of general meaning; 4) delineating units of meaning relevant to the research question; 5) defining codes for categories; 6) grouping data into categories; 7) eliminating redundancies; 8) clustering units of relevant meaning; and 9) finalizing the themes to make them into meaningful concepts.

Results

From the data analyses, three themes emerged: (1) No interest in Making Portfolio; (2) Developed Interest in Making Portfolio in Mathematics (trigonometry), and (3) Usefulness in Making Portfolio to real life Situation. The three themes- and subthemes- that emerged from the lived experience of Bachelor of Industrial Technology student some of them did not have interest in making portfolio. Yet, upon the working with their portfolio in mathematics (trigonometry) as part of the student learning method, the student developed their interest in making portfolio as evident in Theme 2. Theme 3 illustrates the usefulness of Portfolio Making in mathematics in real life situation especially to the student’s major field of specialization. The following sections present the major themes and subthemes.

Theme 1. No Interest in Making Portfolio

Theme 1 can be best explained by three subthemes including learning difficulties in mathematics, classroom environment, past experiences and attitude towards mathematics. From the analysis, it can be understood that as a tech – voc. students, mathematics is one of the difficult subject to them, they have less interest in mathematics subject for some factors such as student learning difficulties in mathematics, the classroom environment, their past experiences in their basic math subject in their elementary and in their high school that resulted to their attitude toward mathematics.

Subtheme A. learning difficulties in mathematics

Some of the students who struggle with mathematics learning regardless of their motivation, past instruction, and mathematical knowledge prior to starting school, some of the students demonstrate slow or inaccurate recall of basic arithmetic facts; answer problems impulsively, without inhibition; have difficulty representing mathematical concepts mentally; have poorly developed number sense; and have difficulty keeping information in their working memory. These are the students who no interest in making portfolio.

The learning difficulty is illustrated in the following statements:

- (1) *“I hate math- I am having difficulty understanding it. I don’t like numbers, I cannot really move myself to like it because I poorly developed the concept in my mind .”*
- (2) *“I am having difficulty focusing and concentrating. I force my self to focus during the discussion yet I am disappointedof myself because I cannot really understand it even in my elementary years, I am not really for numbers.”*

Subtheme B. Teacher factors

Mathematics classroom is another concern of the students’ participants. Classroom is one place where instructors intentionally introduce moments of uncertainty and so-called struggle time for the students, some mathematics teacher are continually unaware of the learning environment that a good balance between student centeredand teacher-focused approaches is a crucial instructional strategy. Those students who do not believe themselves capable of learning mathematics need individualized guidance and encouragement to produce small successes that lead to further gains. These strategies require greater effort on the part of the mathematics instructor than traditional methods, they are essential to low performing students. Also, enthusiasm for learning affects a student’s level of engagement and motivation, creating a cause-and-effect cycle (Burks et al., 2009). When studentsdisengage, the instructor is sometimes tempted to stop motivating them. This, in turn,causes the student to become more unmotivated, causing the teacher to become resentful.

The experience is illustrated in the following statement:

- (1) *“I don’t like math because I have and experience that my math teacher in thepast shout at me because I cannot answer the recitation and most of time, because I cannot immediately understand the discussion some of my math teacher never helped when I asked for it.”*
- (2) *“I think I won’t be so good with math unless I have a really good teacher to really help me with my math work and she makes sure I understandthe work before we move on.”*

Subtheme C. Past experiences

Some of the student participant experienced being stigmatized because they had a bad experience in mathematics in the past, they receive low grade in their elementary and even in their high school that became a factor to dislike mathematics that some of the student’s participants if they encountered the same experienced they recall the feeling of disappointment

and resentment to accept the learning process they should be because they are trapped with their experiences in the past.

- (1) *“I feel like rejected and condemned, I am judged by other people as “stupid” because of what happened...”*
- (2) *In my elementary I used to get a good grade but in the last years of my high school my grade really dropped to almost failed (pasangawa). Then it started getting really hard so that I couldn't understand.*
- (3) *Many times when I take a quizzes and exams in my math subjects I only guess my answer and most of the time I get a wrong answer. If not, I copied the answer of my classmates because I don't really know how to solve a problem specifically if it is a manipulation of formulas. Then most of the time I get bad grade and sometimes get in trouble.*

Theme 2. Developed Interest in Making Portfolio in Mathematics

Despite the struggle in mathematics subject the students' participant developed their interest in making portfolio because of their desire to pass the subject they still insist to pursue to make an output for the requirements that their instructor had given them. They become motivated to work for the portfolio making because it gives them the opportunity to develop the learning skills by means of solving problem in their examples an output in their portfolio. On this process the student participants developed their analytical skills, independence in solving problem, boost self – confidence and developed interpersonal relation to their classmate.

Subtheme A: Analytical skills

Student view the importance of mathematics in a real life situation. They believe that the only way to learn the learning skills in mathematics is through solving and developing the analytical skills they should have to develop through making portfolio in mathematics because of the students' participants desire to have an output for the requirements they realized that they are developing their analytical skills by solving problem and by trying to engage themselves in the process of making portfolio this become opportunity to the students' participants have the ability to visualize, articulate, conceptualize or solve both complex and uncomplicated problems by making decisions that are sensible given the available information and their past experiences in math was replaced by a new good experience in dealing mathematics. In this way, there is an assurance that they can get a good grade and in the future used the analytical learning skills into their real life situation especially in their job. They wanted to have better education and a comfortable life. As mentioned by one of the participants:

- (1) *“In making my portfolio as a requirement in our math subject with Ma'am, I really tried my best to do it, specially that the output in the portfolio is our own given examples, I tried to understand every problem that I made for the purpose that I can answer it correctly, I study so that the formula that I used are applicable to the given problems so that my answers are also correct. Because of this process I got challenge, I do my research in the internet and in the library so that I have more knowledge to answer correctly all the problems in making my portfolio with the aim that I can pass the subject(trigonometry), I am happy because I realized I am already developing my analytical skills that I should have to developed. I really blessed that I try my self to pursue this portfolio making.”*
- (2) *“I need to finish my studies whatever it takes, therefore I decided to try my best to make my requirement in math making my portfolio, I push my self to solve problem and because of this way I realized that I can solve problem and of course developed my analytical skills. Thank God! ”*

Subtheme B: Independence

Even if the students participants have their inhibitions to make portfolio because of their fear in solving math problem because of their past failure in solving problem the desire to pass the subject become their motivating factor to pursue the require to make their portfolio and this made them to realized that they acquired independence in solving problem because they believe that they have to solve their output by themselves, the students' participants allow themselves to break their fear not to have a correct answer. They believe that it is not too late for them to succeed. They need to prove especially to their selves that mathematics is part of life and not a hindrance in the attainment of their dreams. As illustrated in the following statement:

- (1) *"I know I am not good in math even in my elementary years, but it is not an excuse for me not to finish my studies and achieve my dreams... the more that I will strive to study harder...that is why I push myself to do my requirements with maam and fight my fear in math and solve the problem in my own in as output in my portfolio. In that process of making my portfolio I realized that I can make it. Math is fun especially if you can answer the problem correctly."*

Subtheme C: Boost self – confidence

Self-confidence is the belief in oneself and abilities, it describes an internal state made up of what we think and feel about ourselves. Because of the unfavorable experiences of some of the student participant in the pasts in mathematics, the students' participants have less confidence in solving problem and dealing mathematics. This unfavorable conditions and experiences in their growing up years, likely to develop an unhealthy self-esteem and become unconfident of themselves. Some of the students' participants receive negative messages that have been internalized and become part of what they think and feel about ourselves. But, because of the process of portfolio making this experience had been replaced to a positive outlook in math because of trying to have an output they pose their selves to answer problems by solving in their own, that made them realized that they can make it. By the process of solving problem it help them to boost their self confidence again by regaining a positive experience through making portfolio in mathematics as a requirement to pass the subjects.

- (1) *"In my experience in making my portfolio in math 213 (trigonometry) I find it a little bit hard specially in solving problems, I got challenge because from my elementary I got a negative comment of my ability in math, because of this negative comment I developed my low self-esteem, specially math. But because I want to pass this subject I don't want to get failed grade because I am an scholar, I try to make my own portfolio, and I am thankful because it has a positive result I got a high grade. I answer mostly correct on the given problem. I feel somehow a positive feeling about my math ability now."*

Subtheme D. Developed Interpersonal Relation

Some of the students participant, the low performing Bachelor of Industrial Technology students in their process of making portfolio in mathematics when the cannot understand the problem, they don't know how to analytically deal with it, they asks their classmate to help them in solving the problem, some ask for the formula an let themselves solve it by their own, as long as they have examples in their note. But some of the students they ask examples from their classmate and follow the process of solving. Because of these circumstances the students developed their interpersonal relations to each other, those students who are low performing in math ask assistance to their classmate who has an ability to help them, and create a positive relationship to each other.

- (1). *" I am in not good math, I strategized I ask my classmate how to solve the problem and study his given examples and I made my own and I am thankful I learn to solve it like example in solving the trigonometric functions because it needs formula, because of this we become friends."*

Theme 3. Usefulness of Making Portfolio in Mathematics

In the process of making portfolio the students' participants developed different learning skills and their positive attitude toward challenging circumstances. The students believed that life is challenging but they make it, just like making portfolio in mathematics, they believed that they need to discipline themselves to break their fear in math, so that they can achieve high grade and success in studies. This discipline they acquired in making portfolio can be applied in dealing other circumstances in facing life as a person, they manage their time and skills and even their negative attitude towards hard things wisely, and along the way applied this skills in dealing life.

Subtheme A: Applicability of the learning skills acquired by the student participants in making portfolio to their major field of specialization and in real life situation.

Student participants stated that their acquired learning can be used in other field even in their major subjects because they also used math, they also solve problems. What ever they learn specially the analytical skills, self-confidence and interpersonal relationship can be used in real life situations.

(1). "In my major subject in our food subject we also have math, its just a simple math but the same we solve problem, so when we have our quizzes, I can now apply what I learn in the skills

(2.) "I am thankful that I had this experience, making portfolio in math, because I learn so much like solving distance, Pythagorean theorem, trigonometric functions, solutions of right triangle and many more I now appreciate math because when I take the instance exam in PMA(Philippine Military Academy), I encounter this kind of problem there and I think i answer it. So for me making portfolio in math is a good way to develop learning and it can be applied in other field. "

Discussion

Results of the present study showed the emergence of three major themes emerged that would described the lived experiences of Bachelor of Industrial Technology student in making portfolio, these are (1)No Interest in Making Portfolio; (2) Developed Interest in Making Portfolio in Mathematics , and (3) Usefulness of Making Portfolio in Math.

In the first major theme which is students participants has no interest in making portfolio in mathematics, the participants talked about how difficult mathematics subject for them and become factor in their interest in making portfolio. According to the latest Gallup youth survey conducted in 2004 (as cited by Saad, 2005), the subject that the teenagers find most difficult in school is mathematics. Thus, Saad(2005) said that it is not surprising how the subject has the lowest performance rate. Fullarton (1993) as cited in Cabahug and Ladot (2005), stated that poor attitude towards mathematics is often being said as one of the contributing factors to lower participation and less success in the courses. Neale (1969) still cited in Cabahug and Ladot (2005), said that the attitude towards mathematics affects performance as performance in turn affects attitudes. This studies supported that students has less interest in making portfolio in mathematics because of their negative attitudes towards the subject that affects to their interest in performing the requirement in math portfolio making.

The second major theme focused on the developed student's interest in making portfolio in mathematics. Though they may experience difficulty making portfolio, they also shared their developed positive effects on making portfolio such as the learning skills and positive character. The hope that their lived experiences in making portfolio in mathematics can be used in achieving their dreams and goals in their life to have a better job for brighter future and at the same time achieve their personal dreams. According to Lei (2010), motivation varies from different degrees of Intrinsic and Extrinsic Motivation. Intrinsic motivational factors found to be at work with most students include the desire to be involved, curiosity, challenge, and social

interaction. In this study, it refers to sense of fulfillment in the achievement of their dreams. Extrinsic motivational factors include compliance (to meet another's expectation, to do what one is told); recognition (to be publicly acknowledged); competition; and work avoidance (avoid more work than necessary). Present study reveals that Bachelor of Industrial Technology student external motivation is to finish their studies and have a job for brighter future for theme and for their families.

Moreover, the third theme discusses on the usefulness of making portfolio in mathematics of the Bachelor of Industrial Technology students' in their major field and in their daily lives. Student participants stated that their acquired learning can be used in other field even in their major subjects because they also used math, they also solve problems. Whatever they learn specially the analytical skills, self-confidence and interpersonal relationship can be used in real life situations. According to the Federal Republic of Nigeria, (2014) the inclusion of Mathematics as a core subject in the Secondary School curriculum is due to the key roles Mathematics has to play in the achievement of the objectives of the secondary school education, such as promoting of science and technology, provision of trained manpower in the applied sciences, technology and commerce, and the acquisition of appropriate skills, abilities and competence both mental and physical, as equipment for the individual to live on and contribute to the development of his society. Mathematics is one of the school subjects that any nation needs for industrial and technological advancement, useful for most vocation and higher specialized courses of learning (Odili, 2006; Sidhu, 2006). This study supports the claim of the participants that their acquired learning skills, and discipline in making portfolio in mathematics can be applied in other field of endeavor in dealing real life situations.

Conclusion

This study provides a description of the lived experienced of making portfolio in mathematics of the low performing Bachelor of Industrial Technology students'. Student participants experienced no interest in making portfolio because of some factors such as learning difficulties in mathematics, teacher factor in the past and their previous unfavorable experiences in math but because of their desire to achieve their goal and dreams to finish their studies they try to break their learning difficulties in mathematics and be motivated to make the requirement to pass the subject. In their attempts to make portfolio in mathematics they developed interest in math, independence that boost their confidence and developed interpersonal relationship to other. Hence, student participant believe that what the have learned in the process of making portfolio in mathematics can be applied into to other field of endeavor especially to their field of specialization and to the real live situation. It suggest that these in low performing students participants experienced no interest in making portfolio yet they developed the interest in making portfolio because they believe that they can acquire positive learning skills that can be applied into their specialized field of endeavor and to their real situations.. Their lived experiences can encourage and inspired other low performing student to pursue their education.

Recommendation

- [1] The University must design a program that can cater to the needs of low performing student such as academic enhancement programs.
- [2] The University through the Office of the Guidance Services should conduct a intervention program for low performing student that can tackle dealing learning difficulties of the students in different areas and developing one's self.
- [3] Interview family members, teachers, friends and other people which the participants is interacting with to fully grasp how low performing student manage their learning difficulties in their studies.

[4] Further studies and in-depth exploration of the lived experiences of the Bachelor of Industrial Technology students in making portfolio as an assessment tool in mathematics is recommended.

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