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Learning Mathematics and Differentiated Instruction in the Philippines: A Phenomenographical Study on Struggles and Successes of Grade 7 Students

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ABSTRACT

Differentiated Instruction (DI) has been found to be effective in catering to the individuality of students and at the same time helping students to have positive attitudes about school, increased engagement in learning, and improved achievement. In the Philippines, 16 Focus Groups from Grade 7 students were interviewed regarding their experiences on the differentiation of instruction provided by their Mathematics teachers, which in this study the most observed differentiations by the respondents are relating real-life situations to the lessons, modified learning activities, learning activities according to students' preference, teachers' assistance during learning activities, and grouping students based on projects and choice of students. Their verbalized experiences were transcribed as is with no re-statement to conform with Marton's Phenomenographical principles in characterizing the variations of experiences. Using thematic analysis, a dendrogram is used to cluster the conceptions of the experiences of the respondents in this study. A frequency table and a bar graph present the similarities and variations of the Grade 7 Filipino students' conceptions of their experiences on DI. Hence, this study argued that DI motivates students' interest, makes learning mathematics easier, and challenges students to learn and do more. However, the study also argued that students have difficulties in learning and doing mathematical tasks. The findings suggest that considering activities based on students' preference, modified learning activities, variety of assistance provided to students during activities, and variety of relating real-life situations, and creating different groupings are not enough to ensure that differentiation results to an effective instruction.

Keywords:
Learning Mathematics, Differentiated Instruction, Filipino Students, Phenomenographical Study

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Introduction

Learning Mathematics through Differentiated Instruction

Mathematics is a challenging subject to master by students, from primary school to university (Shafie, Shahdanb & Liew, 2010). Authorities in Mathematics concur that attaining mathematics conceptual understanding and procedural skills encompasses various cognitive processes (Watson & Gable, 2012). This includes constructing representations, making arguments, reasoning about mathematical objects, explaining their thinking, constructing proofs, among others (Schoenfeld, 2002, cited by Esmonde, 2009). These learning processes are conceived as causal pathways to successful outcomes that are later linked to achievement outcomes (Geary et al., 2008, cited by Lobato, 2008). According to Grigg, Kelly, Gamoran, and Borman (2013, cited in Carlisle, Kelcey, Berebitsky, & Phelps, 2011), teaching practice influences students' achievement. Ghazalia, Othmanb, Aliasc, and Salehd (2010) added that teaching practice create correct connections on content by using learning materials, and it connects appropriately procedural understanding to conceptual understanding. The stance stated above makes a construct that more effective instruction by the teacher

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practice, the greater the connections to students' understanding, and the more engaged are the students in learning mathematics. In today's classroom, Differentiated Instruction is one of the promising approaches in maximizing the learning potential of each student (Tomlinson, 2005). This teaching approach posits that students are provided with various learning opportunities wherein the teacher differentiates the content of their lesson, teaching process and support to their students, and students' outputs and supports (Chamberlin & Powersz,2010), whereby students have a chance to choose learning tasks according to their readiness, interest and profile (Sherma & Catapano, 2011); whereby teachers help students develop positive attitudes toward school and help them increase engagement in learning, and improve their achievement (Beecher and Sweeny, 2008; Cobb, 2010).

Hunsaker, Nielsen and Bartlett (2010) posit that teachers' differentiation practices affect students' outcomes. In a differentiated classroom, strategies are adapted to students' different learning interests and needs so that all students' experiences are challenging, successful, and satisfactory (George, 2005). Reis and Boeve (2009) claim that when students are given an opportunity to select their own content-based reading materials on their area of interest, they are able to read more appropriately; and when the teacher provides flexibility in solving practical problems in the number sense activities, they encourage students' critical thinking (Yang & Ru Wu, 2010). If instructional materials are varied and students are in different instructional groups, they learn more (Tomlinson, et al., 2003). Also, when students were given a variety of learning activities based on their Multiple Intelligences, the retention is higher (Ghamrawi, 2014). Likewise, students in tiered/layered activities are on the same essential understanding or skills, but different levels of complexity, abstractness and open-endedness are challenged, consequently, students are enabled to apply literacy strategies independently (Tobin & McInnes, 2008). Likewise, according to Geller, Chard, and Fien (2008), students were encouraged to think aloud while they work or share their thinking with peers; and when the behaviors of students are attended, they respond contingently to the scaffolding (Mathes et al., 2005, cited by Tobin & McInnes, 2008). Students in Differentiated Instruction, when given individual learning contracts, are found greatly motivated (Greenwood et al., 2003, cited by Tobin & McInnes, 2008). Moreover, when students are differentiated based on students' needs and targeted learning outcomes, significant increases in student achievement occur (Cobb, 2010). Besides, when teachers differentiate through identifying students' starting point of their learning experience, students gain explicit definitions of the knowledge, understanding, and skills (Brimijoin, 2005). In addition, when students are in flexible small groups, a focus on students' interest has shown very positive results (Vaughn et al., 2003 cited by Tobin & McInnes, 2008). Lastly, Trafton et al. (2001, cited by Stylianides & Stylianides, 2007) note that well-designed real-life tasks stimulate students' interest and engagement. However, there are studies which reveal that despite the preparation of teachers in providing real-life situations in teaching Mathematics using "Mathematics Trails", students do not have a clear grasp of the lesson in the given learning materials (Tsao, 2005). Same happened in the study of Yang and Ru Wu (2010), after carefully reviewing the performance of their students under the designed teaching method, they found out that it does not work for all students; some still have difficulty in understanding the questions.

Learning Mathematics in the Philippines

In 2012, the Department of Education of the Philippines embraces the K-12 curriculum, which means that the Philippine Basic Education observes the Kindergarten plus 12 years to complete its Basic Education Program (DepEd, 2012). This move is taken because of the poor quality of the Philippine Basic Education as reflected by the low achievement scores of Filipino students in the National Achievement Test and the international test known as the Third International Mathematics and Science Study (TIMSS) (Tatsuoka, Corter, & Tatsuoka, 2004; DepEd. 2012). Despite the low performance of the Filipino learners and the diversity of the Philippine classroom situations, some researches reveal the positive side of the poor performing Filipino students, such as that Filipino students have the highest level of enjoyment in learning science (Shena & Tamb, 2008); that Filipino students are developmentally ready to learn competencies assigned by curriculum makers (Felipe, 2006); and that the effort of Filipino students to learn can increase their mathematical ability (Sangcap , 2010). Some studies regarding the use of Filipino as the first language of mathematics students in the Philippines created discussions because it led to a negative result. In the study of Bernardo (2002), the effect of solving worded problems in Mathematics using the first language first (Filipino) is the same as when the second language (English) is used. In the study of Ong, Liao, and Alimon (2009), a correlation exists between problem solving and learning strategies; problem tests written in the first language can facilitate learning. This occurs when students use more learning strategies when they are given problem-solving tests written in their native language, Filipino. This means that they are able to allocate more cognitive resources for comprehension of the problem test rather than for understanding the language in answering the mathematical problems.

Although, there are existing effective models and methods, and appropriate strategies used in learning mathematics developed by different mathematicians and scholars; and researches on diverse areas in learning Mathematics are abounding; and researches on Differentiated Instruction is already proliferating especially on its concepts and practices, the study on the conceptions of students regarding their experiences on DI is still limited. This study presents the structural relationship of variations of experiences and categories of conceptions on how students learn Mathematics through DI. This study sought the answer to this question: What are the successes and struggles of the Filipino Grade 7 students in DI while learning mathematic?

Theoretical Perspective

Differentiated Instruction is a process of proactively modifying the curricula, teaching methods, learning activities and assessments to meet the diverse needs of students and thereby maximizing access to, motivation, for and efficiency of learning. Tomlinson (2001, cited by Beecher & Sweeny, 2008) emphasizes that Differentiated Instruction provides opportunities for students to have multiple options for taking in information, making sense of ideas, and expressing what they learn. According to Tomlinson (1999, 2001) teachers may choose to differentiate their instruction with regard to content (differentiating what students learn), learning process (differentiating the process and activities students participate in to learn), learning product (differentiating the products students develop to demonstrate learning) or learning environment (adjusting the classroom set-up). Each of these can be altered with respect to students' readiness, interests or learning profile. Differentiated Instruction is anchored on seven basic beliefs:

(a) same-age students differ markedly in their life circumstances, past experiences, and readiness to learn; (b) differences have a significant impact on the content and pace of instruction; (c) student learning is heightened when they receive support from the teacher that challenges them to work slightly above what they can do independently; (d) student learning is enhanced when what they are learning in school is connected to their real-life experiences; (e) student learning is strengthened by authentic learning opportunities; (f) student learning is boosted when they feel they are respected and valued within the context of the school and community; and (g) the overarching goal of schooling is to recognize and promote the abilities of each student. (Tomlinson, 2000, cited by Rock, Gregg, Ellis, & Gable, 2008, p 33)

Methods

Phenomenographical Inquiry Design. It is a qualitative research design in which data collection is based on a specific phenomenon experienced by a specific group of people in a specific context (Barnard et al., 1999). Its aim is to characterize variations in experience (Marton, 1981, cited by Varvarigou, Hallam, Creech & McQueen, 2013). It is concerned with seeking 'second order' perspectives or 'conceptions' of phenomena (Sjostrom and Dahlgren, 2002; Naughton, 2008) rather than investigation of what a phenomenon really is. Phenomenography was a term created by Marton (1981, cited by Varvarigou, Hallam, Creech & McQueen, 2013) to describe a qualitative study that aims to find and systematize "forms of thought in terms of which people have different interpretation of significant aspects of reality". The outcome of a Phenomenographical approach is a set of categories of description and the structural relationship between the categories is referred to as "outcome space" (Marton & Booth, 1997, cited by Varvarigou, Hallam, Creech & McQueen, 2013).

Selection and Study Site. There are no rules for sample size in qualitative inquiry, sampling to the point of redundancy is ideal (Patton, 2002, cited by Mashall, Cardon, Poddar, and Fontenot, 2013). In the study of Mashall, Cardon, Poddar, and Fontenot (2013), they found out that most of the data saturation occurred after 12 interviews. From six public schools and five private schools in Manila, 15 focus groups were interviewed. The focus groups consist of seven from the public schools and 8 from the private schools who were selected purposively selected based on the following criteria: (a) willingness and (b) availability of the students. A minimum of five students and a maximum of 10 students were interviewed either in vacant room, hallway with seats or library. Division of City Schools of Manila was chosen as the study site because Manila is the political, economic, social, cultural, and educational center of the Philippines as proclaimed by Presidential Decree No. 940.

Source of Data. The Focus Group Interview Guide is semi-structured based on the principles of Differentiated Instruction which according to Tomlinson (1999; 2000; 2001; 2003; 2004; 2005) and Maker's Model (Kanevsky, 2011), a apriori codes from these were established, hence, questions are pre-structured to surface the conceptions of learning by Grade 7 Filipino students exposed to Differentiated Instruction.

According to Polkinghorne (2005, as cited by Susuki, Ahluwalia, Arora, & Mattis, 2007; Robbins & Vandree, 2009), interviewing is one of the most important strategies and a key source of collection of qualitative data.

Data Gathering Procedure. The students for the focus groups are under different Mathematics teachers whose classes were observed. The interviews were done after each classroom observation.

Each focus group was interviewed in an informal setting so that students can freely answer the questions in Filipino or in English to freely express their real emotions. Using the Interview Guide, each focus interview was done for about 20-35 minutes. With the aid of an audio recorder a using an iPhone which gives clear output despite the uncontrolled noises within the interview area. The researcher personally asked every group about their learning experiences under the Differentiated Instruction. Students were oriented to share only situations and incidents they personally experienced and to share only notions true to him/her personally and not what he/she observed concerning his classmate. According to Green (2005, cited by Khan, 2014), the collection will take place as one interview basis only. He relates that if the participants describe his/her awareness completely during the semi-structure interview session then there is no need to go back to the interviewee for additional interview. The interview will be an open one so that students can think aloud, pause if needed so that students can recall in what manner she/he experiences the phenomenon. Considering that understanding another is devious and we need to use a specific mode of consciousness like empathy (Zahavi, 2001, cited by Boden, Gibson, Owen, and Benson, 2015). Empathic toward the participant, Gemignani (2011, cited by Boden, Gibson, Owen, and Benson, 2015) involves not just sensibly listening to others' words to perceive their meaning but feeling with the whole body, in an open, interconnected, relational process (Finlay, 2005, cited by Boden, Gibson, Owen, and Benson, 2015). In this manner, resonance of feeling is considered, wherein the researcher is also particular with the non-verbal movement, hesitation, and pause so that if there is hesitation, follow up questions like "can you give examples" or "can you explain further" or clarification made is marked as important as the answer of the informants (Vagle, Hughes, & Dublin, 2009). `

Mode of Analysis. From the first language of the interviewees, the interviews were transcribed verbatim where neither interpretation nor re-statement was done; the statements were translated in English personally by the Principal researcher which was also the interviewer to capture the true meaning as she senses and feels what was meant by the students during the interview. Transcriptions of the data from interviews were treated qualitatively as outlined by Sjostrom & Dhlgren, as comprising of seven steps and these are easily understood by novice researchers. The steps are as follows: (1) The first step can be called familiarization which means that the researcher is introduced to the empirical material by reading through the transcripts. The familiarization phase is also necessary for correcting errors in the transcripts; (2) The second step involves compilation of answers from all respondents to a certain question. The main task here is to identify the most significant elements of the answers given by each informant. In this manner, after horizontalizing (Yuksel & Yildirin, 2015), all the meaningful statements are treated as equal value, and when there are overlapping, irrelevant or repetitive statement, the researcher ignores or excludes these statements; (3) The third step is a condensation or reduction of the individual answers to find the central parts of longer answers or a dialogue. After cleaning all the transcribed data, the remaining statements are called horizons (Yuksel & Yildirin, 2015); (4) The fourth step contains a preliminary grouping or classification of similar answers. Hence, thematic coding will be observed to facilitate the development of themes or groups (Geven, 2008). Also, according to Geven (2008), these coded data are both flexible and consistent. Codes and categories must easily be distinguished; (5) The fifth step is a preliminary comparison of categories, where the researcher tries to establish borders between the categories. This is a phase which sometimes entails revision of the preliminary groups. This process of analyzing the data is iterative and comparative and involves continuous sorting and resorting of the data (Arkend, 2005, cited by Taks, Tynjala, Toding, Kukemelk, & Vensaar, 2014); (6) The sixth step consists of naming the categories to emphasize their essence; and (7) The seventh and last step is a contrastive comparison of categories, which contains a description of the unique character of every category as well as a description of resemblances between categories. The categorical system describes the variation of experiences (Taks, Tynjala, Toding, Kukemelk, & Vensaar, 2014).

Phenomenographical research is strictly a data driven analytic method. The analytic process resembles the grounded theory of Galser and Strauss (2009). The main difference is that grounded theory focuses directly on the nature of phenomenon, whereas, Phenomenographical approach aims to describe individuals' conceptions of their experience of the phenomenon. Hence, thematic analysis is observed to facilitate the search of patterns of conceptions within a qualitative data set (Gaven, 2008). In this manner, to determine the hierarchical clusters of similarities of the conceptions of the students, a dendrogram was utilized (Moyer-Packenham, et al., 2015). To present the indicator of how similar and dissimilar are the conceptions, the researchers use a frequency table and stack bar type of graph in the Microsoft excel program which is similar

to the heat map analysis for the graphical representation of the similarities and dissimilarities. The space of each bar in the stack bar shows which of the conceptions are most taken and least taken by the Grade 7 Filipino students, while color codes represent the similarities of their conceptions.

To find out the reliability of the categories, the researchers show a way to describe similarities and differences that are supported by the data from transcriptions, having excerpts from the interviews to support the categories. This process is called an audit trail, which provides the reader or validators with evidence of trustworthiness by which she or he can start with the raw data and continue along the trail to validate by herself or himself if, in fact, the trail points to the outcomes claimed by the researchers (Kane, Sandretto, & Heath, 2002).

Ethical Consideration. Consent of the authorities and participants of the study was sought by the researchers. The Department of Education in the City of Schools of Manila clearly stated to the Principal researcher that there must no disturbances of classes, hence, students were interviewed during lunch break or their vacant time. The teachers choose the member of their focus group and only students who are willing to participate are included in the focus group. Names of schools, teachers, and students were handled with confidentiality during the data gathering, presentation of data, and dissemination of findings of the study. The data gathered and the findings of this study are kept in strict confidentiality. Responses of the interviewees were recorded without bias, for interviewees were assigned name codes.

Findings

To answer the research question, what are the struggles and successes of Filipino Grade 7 Mathematics students in Differentiated Instruction while learning Mathematics. Meaningful statements regarding the experiences of Grade 7 Mathematics students were captured through the focus group interviews. Conceptions without re-statement were analyzed. Findings are presented into two parts: (1) Features of Differentiation to described the details of how students perceived their experiences as successes and struggles; and (2) the structure of their conceptions, its similarities and differences which are the core of the study. Data gathered are presented in tables and graphs to delineate the similarities and differences of their conceptions regarding their experiences in learning mathematics through Differentiation Instruction. Table 1 shows differentiation experienced by the respondents which includes relating real-life situations to the lesson, modified learning activities, learning activities according to students' preference, teachers' assistance during learning activities, and grouping students into smaller units.

Table 1. Differentiated Instruction Experienced by Grade 7 Mathematics Students in the Philippines

FOCUS GROUPS	RELATING REAL-LIFE SITUATION	LEARNING ACTIVITIES	STUDENTS' PREFERENCE	TEACHERS' ASSISTANCE	STUDENTS' GROUPINGS
A					
B					
C					
D					
E					
F					
G					
H					
I					
J					
K					
L					
M					
N					
O					

Legend: presence absence

I. Conceptions of Experiences of the Grade 7 Students in Differentiated Instruction

The above differentiations are experienced by the Grade 7 Mathematics students in the Philippines. These experiences provide conceptions to the Grade 7 Mathematics students which are captured through the meaningful statements of the focus groups. Each of the five common features of differentiation delineates various conceptions of the respondents' experiences, namely: "Makes them interested", "Makes things easier", and "Make them learn/do more", "Negative emotions" and "Failure to complete the task". Details of these conceptions are presented below.

1. In Relating Real-life Situations to the Lessons

Relating real-life situations to the lessons is not new in teaching Mathematics. What makes this a feature of DI is when they are appropriate to the students' real-life situations. Relating real-life situations to the lesson provides variety of conceptions that lead to students' successes and struggles in learning mathematics.

On one hand, some students share that when their teacher relates real-life situations in teaching mathematics, they become energized, active, excited, and happy; in short, it makes them interested. Evidence of this conception were captured from the focus group responses: "An exercise related to the lesson. 'Magexercise tayo tuwing umaga' ('Let's exercise every morning' is an action song in the Philippines). We became awaken and energized;" "I became energized and active;" and "I became happy and excited when I heard the teacher mentioned familiar characters from a TV show."

Another conception from their experiences in relating real-life situations in the mathematics lesson is "Makes things easier". One focus group mentions "Ah, we didn't just learn Mathematics in class. We were asked to apply measurements at home, for example, measuring size of the furniture and weight of flour." This makes learning measurements easier." Another focus group says "Learning through real-life situation makes me sense it easily." Likewise, some students say that relating real-life situations to the lesson challenges them to learn and do more. Students who where tasked to do the activity based on the characters of the famous daily noontime TV show "kalye serye" were excited to do the task because they felt that they are included in the "kalye serye". This claim is captured in their response "We help Lola Dora find many angles in our room."

On the other hand, to some students, relating real-life situations in the lesson created negative emotions while learning. They were confused and shocked because they were not expecting that the situations can be connected to the lesson. This conception is captured by following responses: "I thought those were just mere flowers, surprisingly, there are thrills inside them. I could not believe that they can be used in Algebra;" "It is because we do not have a garden; that is why it's shocking." Another negative reaction to relating real-life situation is it causes delay of students' performance. Some students say, "We became engrossed to the activity that is why we were late in accomplishing the required learning task;" and "We chose activity C wherein we needed to show angles through dance moves and so we enjoyed a lot, that is why we focused much in practicing the dance moves. This causes us delay."

2. In Modified Learning Activities

Learning activities are purposely given to effect active learning in the classroom. There are classic learning activities that are proven to be effective, such as games and simulations, effective questioning, collaboration (group works), debates, pair think share, and many more. These learning activities are commonly observed in Mathematics classes in the Philippines. What make these learning activities differentiated is when these are purposely altered and aligned with the students' readiness, profile, and interests at the same time the students have the options to choose which activities they want to engage in. In this study, students experienced modified learning activities according to their interest and level of difficulty. From these experiences, they share their conceptions about modified learning activities. Some say this make them amazed, encouraged, entertained, and happy. Collectively, this is tag as "Makes them interested" in learning Mathematics. One student says, "The familiar names make me awake during mathematics time. I felt excited because I am able to help the character in the learning activity solve the problem;" "Excited because I like to share their story to others". Some students feel happy and share, "We are glad and amazed, and it's like ma'am was great. in summarizing numbers." Some students relate that modified learning activities make them do these easily. "That the lesson is about angles, as the web become bigger, it formed an angle and became perfect angle, you can visualize angles in the spider web which makes it easier to identify the angles." Likewise, some students perceived their experiences challenged them to do more in the activity. The say, "Like what you've said, even though math is not our favorite, when interesting, it more challenging because it makes me understand the lesson even better." Other students share that the learning activity makes them do the learning task easily. "We're excited because the teacher already explained it to us, which makes it easier and challenging." In contrast, some students relate that they failed to do the task because they prefer to use their own strategy. One student shares that "Drawing is easier for me. Drawing because it's measurable." He added that he uses his personal techniques in solving the algebraic equations in the notebook because it has lines in it wherein he can put a mark to estimate the measurement.

3. In Doing Learning Task Based on Students' Preference

Differentiated Instruction is all about considering students' readiness, profile, and interest, hence, the conceptions of the experiences of Grade 7 mathematics students were captured through the focus group

interview. Some students say that they have the option to choose the task which created a variety of notions. Some shared that they had happy, joyful, and lovable experiences when they were engage in the learning tasks of their interest. One says, "For me, I enjoy what I am doing which turn to giving more effort because I love what I am doing." Others say that differentiation makes them learn mathematics easier. He says, "Sir has given us the activities because he knew that some of you were kinesthetic and visual, he grouped us accordingly." One respondent relates, "We enjoy doing the learning task we chose; we are engrossed in our practice that we did not notice the time allotted for it, hence, we almost did not complete the given task." These consequence of delay in accomplishing the learning task is a negative experience of students exposed to DI.

4. On Teachers' Assistance During the Learning Activities

According to the student respondents in the focus groups, Filipino mathematics teachers help students during their learning activities by checking if they are doing the learning tasks accordingly; sensing students' needs pertaining to the learning tasks; giving prompts and positive comments to students who are doing the learning tasks right and in progress; guiding students who have difficulty in executing the learning tasks; and providing information to help students expedite their progress in doing the learning tasks. Teachers' assistance was provided during individual seat work and group activities. Teachers' assistance is considered a form of differentiation since teachers personally address the students' academic needs and sometimes even learning materials as one student shares that his teacher lends her writing pens when the teacher senses that they don't have marker pens needed for the performance task. Some utter the words like thankful and happy. "I felt thankful and I was glad because that's a big help for us." Likewise, academic assistance by the mathematics teachers created an impact to students. They share, "While being assisted by our teacher, we're happy and overwhelmed because there is someone who helps us when it is getting harder for us." While others say that the assistance of their teachers make them do the learning activity right. Another student narrates, "Sir explained to us first what to do, and when we already knew it, it was easy for us to answer the questions." While other students perceived that teachers' assistance challenged them to do the work independently. "I asked sir how I can get the measurements, then I can answer it myself, because I finally knew what to do." In contrast, many of the students feel nervous, as one student relates, "I felt nervous because I might have wrong answers." One student says that she felt shocked of the many learning activities. Other students claim that learning activities caused them failure to complete the task due to difficulty to figure out the right procedure. As one student says, "Ok, I found it hard to memorize the tiles that is the representation of the negatives and positives, because I did not know that negative sign was subtraction.

5. In Grouping Students into Smaller Units During Performance Task

Grouping students into smaller units is one teaching strategy used by the Grade 7 Mathematics teachers in the Philippines. Smaller groups are formed for collaboration in learning wherein fast learners help those who are struggling to understand the lesson. Students who experienced through this strategy have various conceptions about their experiences, making them feel energetic, and making things easier to understand such as being able to do more because of collaboration. The following were their statements: "It makes us more energetic; ""We can help each other in reviews or in group work; the more members, the more ideas share;" "We were able to get the right answer through repetition then all of us solved the problem. If some got the same answer, that will be our final answer. That is check and balance. If all of us got the wrong answer, we'll repeat it;" "Groupings seem to be on a relaxed mode. It's the magic because you'll learn how to solve mathematics faster." In contrast, others say that their group became unfruitful because some of their members are not cooperating and sometimes, they are unruly. Grouping makes them afraid, nervous, and hesitant. One student shares, "I think I was afraid because we might lose the game or our classmates might not learn from the activity because that's group work. To other students, groupings cause them not to accomplish the task as one student says, "I found difficulty in the grouping because others were not cooperative members. "

Overall, it is shown in Table 1 that students in the same focus group differ in their conceptions; not all focus groups experienced the same features of differentiation. Some differentiations were experienced by some groups while others did not, yet collectively their conceptions delineated categories which are presented in Table 2 and Figure 1, serve as representations of the similarities and variations of conceptions of Grade 7 Mathematics students on their experiences. The structure of their conceptions of their experiences in DI is summarized in two clusters as successes and struggles. Successes are categorized as "Makes things interesting", "Makes things easier", and "Makes one learn/do more"; while, struggles as "Negative emotions" and "Failure to complete the task".

Table 2. Frequency Distribution of the Conceptions of Students' Experiences to Features of Differentiated Instruction

CONCEPTIONS OF GRADE 7 STUDENTS		FOCUS GROUPS															
		A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	TOTAL
Makes things interesting	D1			1			1				1						3
	D2			1		1											2
	D3	4				1	4			1	2		1			1	14
	D4		1	1		2	1	3							1		9
	D5					1							1				2
	TOTAL	4	1	3	0	5	6	3		1	3	0	2	0	1	1	30
Makes things easier	D1	1	1					1									3
	D2		1	3	2		3	4	1		2		2	1	1		20
	D3				2	1											3
	D4	1			4		2					2				1	10
	D5	1	1	1		6	2	2				1			1		15
	TOTAL	3	3	4	8	7	7	7	1	0	2	3	2	1	2	1	51
Make one to learn and do more	D1	1		1			1	2		1				1			7
	D2	1		1			1	2		1				1			7
	D3					1	1		1					1	1		5
	D4						1		1	1	1						4
	D5	3				8				1							12
	TOTAL	5	0	2	0	9	4	4	2	4	1	0	0	3	1		35
Negative emotions	D1			2	5												7
	D2			4		2							1				7
	D3									1							1
	D4					2	1	1									4
	D5		1		2									1			4
	TOTAL		1	6	7	4	1	1		1			1	1			23
Failure to complete the learning task	D1						1				1						2
	D2									1	3	1					5
	D3	1				3	1				2						7
	D4										1					1	2
	D5												1		1	1	3
	TOTAL	1	0	0	0	3	2	0	0	1	7	1	1	0	1	2	19

Legends: D1-Relating real-life situation to the lesson, D2-Modified learning activities, D3-Students' preference in doing learning activities, D4-Teachers' assistance during learning activities, and D5- Students' grouping during learning activities

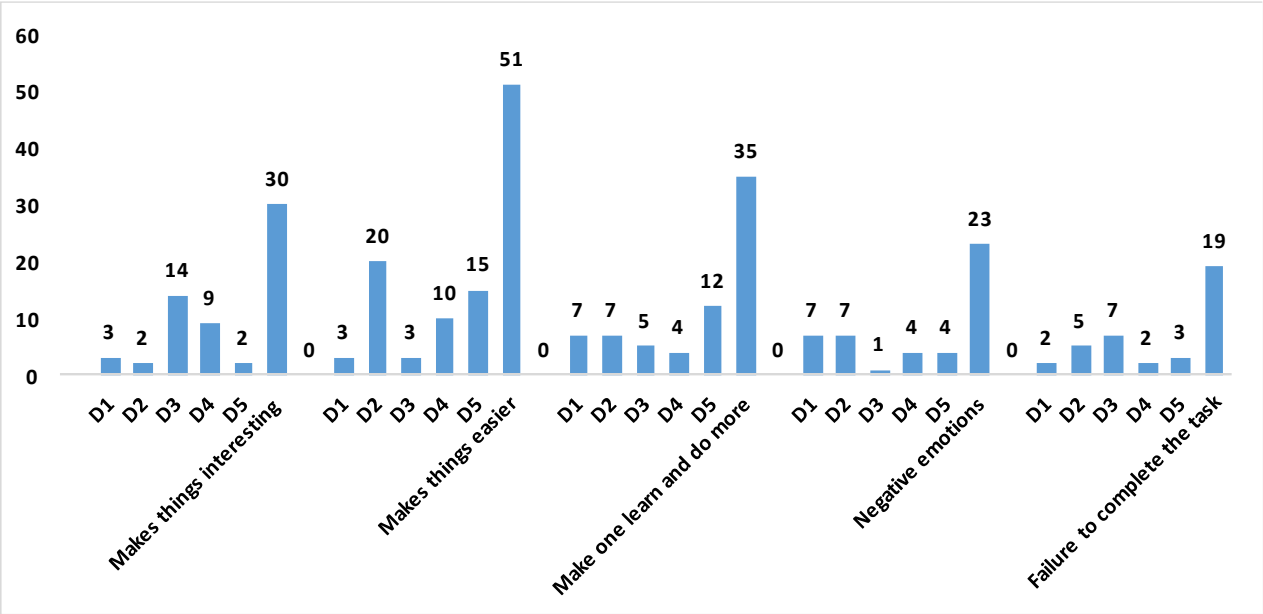

Figure 1. Frequency Distribution of the Conceptions of the Experiences of Grade 7 Mathematics Students per Feature of DI

II. Structure and Variations of the Conceptions of Grade 7 Filipino Students

Table 2 and Figure 1 show the conceptions of students' experiences perceived by the students who shared what they felt about their experiences in DI. On one hand, successful experiences include "Makes things interesting," "Makes things easier," and "Makes one learn more/do more." On the other hand, struggles include "Negative emotions" and "Failure to complete the task".

The variations of conceptions of the respondents on this study surfaced five themes namely, "Makes things interesting", "Makes things easier", and "Makes one learn/do more", "Negative emotions", and "Failure to complete the task".

On one hand, there are positive conceptions of students experiences in the features of DI. Most of the student respondents felt that when they were given learning activities to accomplish they had the opportunity to choose these based on their interest, hence, they consider that D3 (Students' preference) provision in DI "makes things interesting". This is prominently expressed by students in the 7 focus groups. The next feature D4 (Teacher's assistance during the learning activities) has the next highest frequency of students who consider that it makes things interesting, too. It is only in one class as revealed by one focus group that students consider almost all features of DI (D2, D3, D4, and D5) makes things interesting when learning mathematics.

Another conception of the students' experiences in DI is "Makes things easier". D2 (Modified learning activities) and D5 (Students' grouping during learning activities) have the highest frequency of students who consider that it makes things easier during DI. Ten out of fifteen focus groups consider that D2 makes things easier while they are learning; whereas, eight focus groups consider D5 feature of DI makes things easier. Most students felt that their experience in D5 (Students' grouping during learning activities) makes one learn/do more. This conception of their experiences in DI prominently felt in D1 (Relating real-life situations to the lessons) and D2 (Modified learning activities).

On the hand, their negative conceptions include "Negative emotions" and "Failure to complete the task". Most of those who responded expressed "negative emotions" such as fear, nervous, shock, hesitant, pressure, and confused for their experiences of D1 (Relating real life situation and D2 (Modified learning activities). Only one to three focus groups were vocal about those negative emotions in all the five features of DI. Most of the students who revealed "Failure to complete the task" said that they experienced this in D2 and D3 features of DI. This was also expressed by fewer students regarding their experiences of D1 (Relating real-life situations to the lesson) D4 (Teachers' assistance during learning activities), and D5 (Students' grouping during learning activities). Only 9 out of 15 focus groups expressed this conception.

Using a dendrogram, clusters of conceptions of students' experiences on DI were revealed and presented in a structure based on Marton's Phenomenographical principles, as shown in Figure 2.

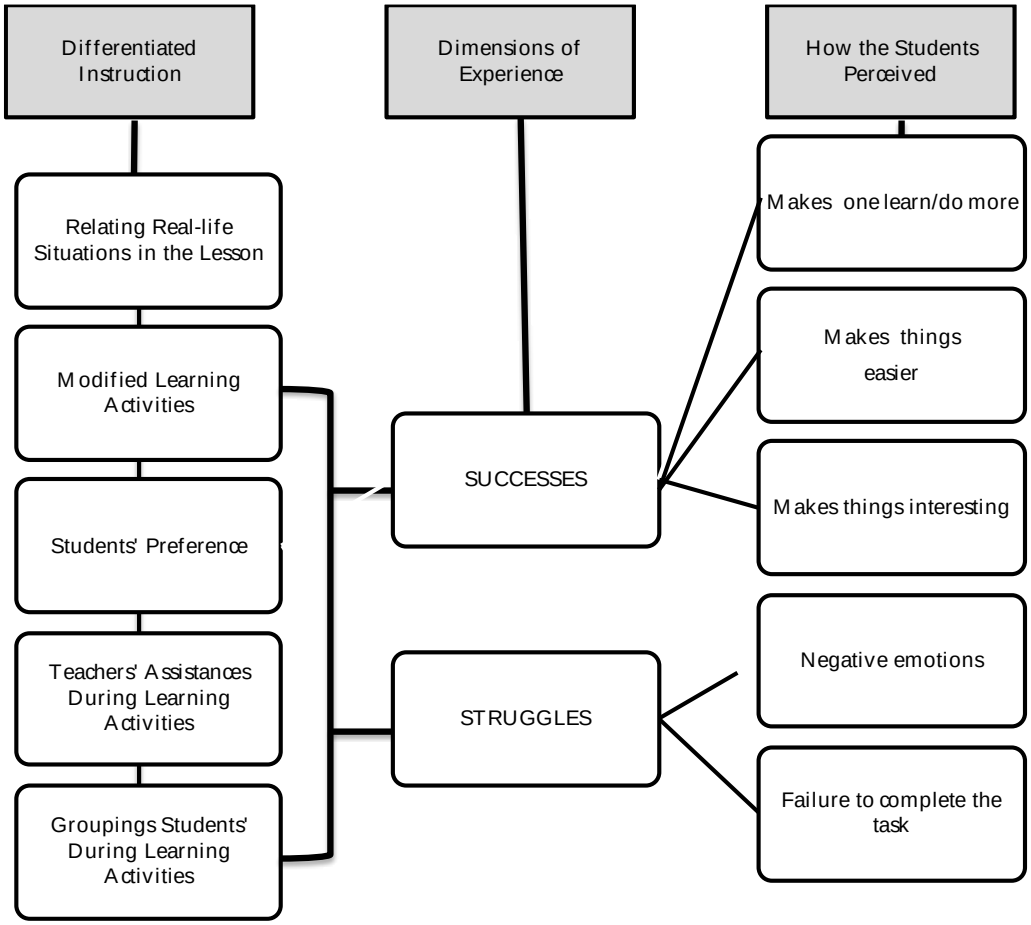

Figure 2. Variation and Structure of Conceptions of Students on Differentiated Instruction

Discussion

Features of differentiation differ from one country to another, and students' experiences also differ. Yet, collectively, in this study, their experiences provided similar meaningful statements that surfaced the categories of conceptions of the students, namely: "Makes things interesting", "Makes things easier", and "Makes one learned/do more", "Negative Emotions" and "Failure to complete the task".

The conceptions of the students were supported by the previous researches. DI helps students form positive attitude toward learning or making them interested in learning Mathematics. Kanevsky (2011) state that providing students' learning preferences facilitates participation and develops self-knowledge. Furthermore, with this process of learning, students will eventually enjoy more in their learning mathematics. This account is very true with the finding of this study wherein most students claim that learning based on students' preference makes the lesson interesting. In general, applying DI, makes students livelier, enthusiastic and have positive attitude, as claimed by Papanastasiou (2002), applying Differentiated Instruction makes students more interactive, livelier, and enthusiastic. Papanastasiou (2002) claimed that DI improves students' performance, enthusiasm, and engagement in doing the learning task; Beecher and Sweeny (2008); Hong, Yihua, and Pelletier (2012) mention that low-intensity grouping develops self-concept in different instructional arrangements; and Cobb (2010) posits that DI helps students develop positive attitude about school. These researches support the findings of this study that students were happy, excited, and joyful to do the learning tasks.

Another conception provided by the respondents of this study on students' experiences in DI is "Makes things easier". Manavathu & Zhou (2012) relate that utilizing content-embedded visual illustrations foster handout readability and constructed easy contextual meaning. Moreover, Firmender, Reis, and Sweeny (2013) share that differentiation of content in reading materials challenges students to read above their

chronological grade level. This conception is the most prevalent when students engage in modified learning activities. In general, DI helps students do the task easier as revealed in the study of Konstantinou-Katzi, Eleni Tsolaki, Meletiou-Mavrotheris & Koutselini (2013). They relate that DI helps improve the effectiveness of mixed-ability mathematics classes. King-Sears (2007) claims that with the provided with their preferred learning centers, students have more opportunities to practice. This category is most perceived D3 (Students' preference), a feature of DI.

"Makes one learn and do more", as one of the themes surfaced in this study, in the study is supported by Gavin, Casa, Adelson, Carroll, and Sheffield (2009), who relate that differentiations using advanced standards-based mathematics curriculum enabled students gain much learning and ability to expound their reasoning in a certain learning activity in Geometry. Geisler, Hessler, Gardner, and Lovelace (2009) say that students can more actively participate in their own education by self-monitoring their writing using curriculum-based measures; and Reis (2011) emphasizes that DI increases students' enjoyment and engagement in reading. Mastropieri, Scruggs, Norland, McDuffie, and Connors (2006) share that differentiated activities, make students learn more content than without peer-mediated learning activities; and Weiser and Mathes (2011) declare that direct and explicit encoding instructional strategies produce positive gains for students. This is true in this study wherein modified learning activities encourage students to learn and do more. One new conception that is not supported in other researches which is dominant in this study is that teachers' assistance during learning activities make students learn and do more.

To some experts, DI does not provide only positive experiences but negative as well. Papanastasiou (2002) relates that in other countries grouping is not as effective as other countries like Cyprus, where help of their friends during groupings is important to their learning Mathematics. McCoach et al. (2014) relate that groupings does not show g any difference in students' performance as compared to non-grouping of students. More so with the experimental study of Little, McCoach, and Reis (2014), they found that students under DI provide no difference in their achievement than the control group. Likewise, in the study of Chamberlin and Powers (2010) they found out that five out of the six students provide description of the math learning activity correctly, however, four of the students failed to demonstrate the area model.

Overall, from the different features of DI provided by the Grade 7 Mathematics teachers surfaced five themes namely "Makes things interesting", "Makes things easier", and "Makes One Learned/Do More", "Negative Emotions", and "Failure to complete the task". Hence, this study shows that every feature of differentiation created a variety of experiences to students.

Conclusion

DI provided by the Grade 7 Mathematics teachers in the Philippines that is most felt by the respondents of this study in the following feature of DI, relating real-life situation to the lesson, modified learning activities, learning activities according to students' preference, teachers' assistance during learning activities, and grouping students into smaller units. This study argued that these DI makes students interested in learning mathematics, makes learning mathematics learning easier, makes students learn and do more, makes students have negative emotions, and makes the students experience failure in learning and doing mathematics tasks. The findings suggest that considering students' preference, having modified learning activities, assisting students during activities, relating real-life situations, and creating smaller groups are not enough to ensure a successful and effective instruction. This observation is with consideration that some focus groups are very vocal while other focus group are as witty as the other focus groups.

This paper advances existing literature by presenting the Grade 7 Filipino students reacted to the above features of DI. This finding could be a nuggets of truths on the successes and failures of students in learning mathematics, yet, this finding could be used as feedbacks in planning curricular and instructional programs to ensure increase academic achievements in learning mathematics. As Winston Churchill says, "Success is not final, failure is not fatal: it is the courage to continue that counts". Lastly, given to some limitations of the study, such as limited time allotment for the focus group interview due to "No disturbances of classes" policy of the Department of Basic Education in the Philippines, this limit the researchers to draw more conceptions from the respondents, hence, further studies to test and enhanced the findings of this study by considering the time allotted for focus group interview.

Reference

Beecher, M. & Sweeny, S. (2008). Closing the achievement gap with curriculum enrichment and differentiation: One School's Story. *Journal of Advanced Academics Behavioral Sciences*, 8, 294–298.

Bernardo, A. (2002). Language and Mathematical Problem Solving Among Bilinguals. *The Journal of Psychology*, *136*(3), 283-297.

Bernardo, A. & Calleja, M. (2005). The Effects of Stating Problems in Bilingual Students' First and Second Languages on Solving Mathematical Word Problems. *The Journal of Genetic Psychology*, *166*(1), 117–128.

Boden, Z., Gibson, S., Owen, G. 7 Benson, O. (2015). Feelings and Intersubjectivity in Qualitative Suicide Research. *Qualitative Health Research*, 1-13

Chamberlin, M. ◎& Powers, R. (2010). The promise of differentiated instruction for enhancing the mathematical understandings of college students. *Teaching Mathematics and Its Applications* 1-27, d o i :1 0 1 0 9 3/ t e a m a t / h r q 0 0 6.

Cho, S. Yang, J. & Mandracchia, M. (2015). Effects of M3 Curriculum on Mathematics and English Proficiency Achievement of Mathematically Promising English Language Learners. J*ournal of Advanced Academics, 26*(2), 112–142 DOI: 10.1177/1932202X15577205.

Cobb, A. (2010). To Differentiate or Not to Differentiate Using Internet-Based Instruction, *Kappa Delta Pi Record, 51*(1), 13-17, DOI: 10.1080/00228958.2015.988559.

Esmonde, I. (2009). Ideas and Identities: Supporting Equity in Cooperative Mathematics Learning. *Review of Educational Research, 79*(2), 1008–1043 DOI: 10.3102/0034654309332562.

Felipe, A. (2006) Unexpected learning competencies of Grades 5 and 6 pupils in public elementary schools: A Philippine report. *International Education Journal, 7*(7), 957-966.

Firmender, J. Reis, S. & Sweeny, S. (2013) Reading Comprehension and Fluency Levels Ranges Across Diverse Classrooms: The Need for Differentiated Reading Instruction and Content. *Gifted Child Quarterly, 57*(1), 3–14, DOI: 10.1177/0016986212460084.

Gavin, K. Casa, T., Adelson, J. Carroll, Sheffield, L. (2009). The Impact of Advanced Curriculum on the Achievement of Mathematically Promising Elementary Students. *Gifted Child Quarterly, 53* (3), 188-202.

Geisler, J. Gardner, III, T. & Lovelace, T. (2009) Differentiated Writing Interventions for High-Achieving Urban African American Elementary Students. *Journal of Advanced Academics, 20*(2), 214–247.

George, P. (2005). A Rationale for differentiating instruction in the regular classroom. Theory into Practice, 44(3), 185-193.

Ghamrawi, N. (2014). Multiple Intelligences and ESL Teaching and Learning: An Investigation in KG II Classrooms in One Private School in Beirut, Lebanon. *Journal of Advanced Academics*, *25*(1), 25–46.

Ghazalia, M., Othmanb, A. Aliasc, R. & Salehd, F. (2010). Development of Teaching Models for Effective Teaching of Number Sense in the Malaysian Primary Schools. *Procedia Social and Behavioral Sciences,* 8, 344–350.

Grigg, F. Kimberle A. Kelly, Adam Gamoran, Geoffrey D. Borman 92013). Effects of Two Scientific Inquiry Professional Development Interventions on Teaching Practice. *Educational Evaluation and Policy Analysis, 40*(10), 215–229.

Groenewald, T. (2004). A Phenomenological Research Design Illustrated. *International Journal of Qualitative Methods, 3*(1), 1-25.

Hong, G., Corter, C., Hong, Y. & Pelletier, J. (2012). Differential Effects of Literacy Instruction Time and Homogeneous Ability Grouping in Kindergarten Classrooms: Who Will Benefit? Who Will Suffer? *Educational Evaluation and Policy Analysis 34*(1), 69–88, DOI: 10.3102/0162373711424206.

Hunsaker, S., Nielsen, A. & Bartlett, B. (2010). Correlates of Teacher Practices Influencing Student Outcomes in Reading Instruction for Advanced Readers. *Gifted Child Quarterly, 54*(4) 273–282.

Kane, R., Sandretto, s. & Heath, C. (2002). Telling half the story: A Critical Review of research on the teaching beliefs and practices of university Academics. *Review of Educational Research, 72*(2), 177-228.

Kanevsky, L. (2011). Deferential Differentiation: What Types of Differentiation Do Students Want? *Gifted Child Quarterly 55*(4) 279–299.

Khan, S. (2014). Phenomenography: A Qualitative Methodology in Bangladesh. *International Journal on New Trends in Education and Their Implications 5*(2), 34-43.

King-Sears, M. 92007). Designing and Delivering Learning Center Instruction, *Intervention in School and 42*(3), 137–147.

Konstantinou-Katzi, P., Tsolaki, E., Meletiou-Mavrotheris, M. & Koutselini, M. (2013). Differentiation of teaching and learning mathematics: an action research study in tertiary education. *International Journal of Mathematical Education in Science and Technology*, *44*(3), 332-349, DOI: 10.1080/0020739X.2012.714491.

Little, C., McCoach, B. & Reis, S. (2014). Effects of Differentiated Reading Instruction on Student Achievement in Middle School. *Journal of Advanced Academics 25*(4), 384–402, sagepub.com/journals DOI: 10.1177/1932202X14549250.

Lobato, J. (2008). On Learning Processes and the National Mathematics Advisory Panel Report. *Educational Researcher, 37*(9), 595–601 DOI: 10.3102/0013189X08327999.

Manavathu, M. & Zhou, G. (2012). The Impact of Differentiated Instructional Materials on English Language Learner (ELL) Students' Comprehension of Science Laboratory Tasks. *Canadian Journal of Science, Mathematics and Technology Education, 12*(4), 334-349, DOI: 10.1080/14926156.2012.732255.

Marshall, B., Cardon, P., Poddar, A. & Fontenot, R. (2015). Does Sample Size Matter in Qualitative Research? *A Review of Qualitative Interviews in is Research. Journal of Computer Information System. 54*(1), 11-22.

Mastropieri, M., Scruggs, T. Norland < J., McDuffie, K. & Connors, N. (2006) Differentiated Curriculum Enhancement in Inclusive Middle School Science: Effects on Classroom and High-Stakes Tests. *The Journal of Special Education, 40*(3), 130–137.

McCoach, B. Gubbins, J., Foreman, J., Rubenstein, L. and Rambo-Hernandez, K. (2014). Evaluating the Efficacy of Using Pre-differentiated and Enriched Mathematics Curricula for Grade 3 Students: A Multisite Cluster-Randomized Trial. *Gifted Child Quarterly*, *58*(4) 272–286 sagepub.com/journalsPermissions.nav DOI: 10.1177/001698621454763.

Moyer-Packenham, P., Bolyard J., , Oh , H., Kridler , G. & Salkind, G. (2006). Representations of Teacher Quality, Quantity, and Diversity in a National Mathematics and Science Program. *Journal of Educational Research & Policy Studies, 6*(2), 1-40.

Naughton, V. (2008). Picture It! *The Reading Teacher*, *62*(1), 65–68.

Ong, P., Liao, V. & Alimon, R. (2009). Moderating Language and Number of Mathematical Operations in the Relationship between Problem Solving Scores and Learning Strategies. *TESOL Journal, 1*, 58-78, http://www.tesol- journal.com.

Papanastasiou, E. (2002). Factors that Differentiate Mathematics Students in Cyprus, Hong Kong, and the USA. *Educational Research and Evaluation, 8*(1), 129-146

Reis, S. & Boeve, H. (2009). How Academically Gifted Elementary, Urban Students Respond to Challenge in an Enriched, Differentiated Reading Program. *Journal for the Education of the Gifted, 33*(2), 203–240.

Reis. S., McCoach, B., Little, C., Muller, L. Kaniskan, B. 2011. The Effects of Differentiated Instruction and Enrichment Pedagogy on Reading Achievement in Five Elementary Schools. American Educational Research Journal 48(2), 462–501, DOI: 10.3102/0002831210382891.

Rock, M., Gregg, M. Ellis, E. and Gable, R. (2008). REACH: *A Framework for Differentiating Classroom Instruction*, *32*, 259–271.

Sangcap P. (2010). Mathematics-related Beliefs of Filipino College Students: Factors Affecting Mathematics and Problem Solving Performance. *Procedia Social and Behavioral Sciences, 8*, 465–475.

Shafie, N., Norainu Tengku n Tengku Shahdanb & Shahir Liew (2010). Mastery Learning Assessment Model (MLAM) in Teaching and Learning Mathematics. P*rocedia Social and Behavioral Sciences, 8*, 294–298.

Sherma, H & Catapano, S. (2011). After-School Elementary School Mathematics Club: Enhancing Achievement and Encouraging Future Teachers. *Educational Research Quarterly, 35*(1), 3-16.

Sjostrom, B. & Dalhgren, L. (2002) Applying Phenomenography in nursing research. *Nursing Thoery and Concept Development or Analysis. 40*(3), 339-344.

Tatsuoka, K. Corter, J. & Tatsuoka, C. (2004). Patterns of Diagnosed Mathematical Content and Process Skills in TIMSS-R across a Sample of 20 Countries. *American Educational Research Journal, 41*(4), 901-926.

Tobin, R. & McInnes, A. (2008). Accommodating differences: variations in differentiated literacy instruction in Grade 2/3 classrooms. *Literacy, 42*(1).3-7 DOI: 10.1111/j.1467-9345.2008. 00470.x

Tomlinson, C. (2005). Grading and Differentiation: Paradox or Good Practice? *Theory into Practice, 44*(3),262-269.

Tomlinson, C., Brighton, C., Hertberg, H., Callahan, C., Moon, T., Brimijoin, K., Conover, L. & Reynolds, T. (2003). Differentiating Instruction in Response to Student Readiness, Interest, and Learning Profile in Academically Diverse Classrooms: A Review of Literature. *Journal for the Education of the Gifted, 27*(2/3), 119–145.

Tsao, Y. (2005). Integrating the Design Mathematical Trail in Mathematics Curriculum for the Sixth Grade Student. *Journal of Instructional Psychology, 37*(1), 81-96.

Vagle, M., Hughes, H. & Durbin, D. Remaining Skeptical: Bridling for and with One Another. *Fields Methods. 21*(4), 347-367.

Varvarigou, M., Hallam, S., Creech, A. & McQueen, H. (2013). Different ways of experiencing music-making in later life: Creative music sessions for older learners in East London. *Research Studies in Music Education*, 35,103.

Watson, S. & Gable, R. (2012). Unraveling the Complex Nature of Mathematics Learning Disability: Implications for Research and Practice. *Learning Disability Quarterly 36*(3), 178–187: sagepub.com/journalsPermissions.nav DOI: 10.1177/0731948712461489.

Weiser, B. & Mathes, P. (2011). Using Encoding Instruction to Improve the Reading and Spelling Performances of Elementary Students at Risk for Literacy Difficulties: A Best-Evidence Synthesis. Review of Educational Research 81(2), 170–200, DOI: 10.3102/0034654310396719.

Yang, D, & Ruwu, W. (2010). The Study of Number Sense: Realistic Activities Integrated into Third-Grade Math Classes in Taiwan. *The Journal of Educational Research,* 103,379–392.