Self-perceived and actual competencies of senior high school students in General Mathematics

Leo A. Mamolo and Shalom Grace C. Sugano

Abstract: Having produced the first batch of the K to 12 program graduates in the country in 2018, an evaluation of their acquired competence is one of the priorities of the government. This study analyzed the perceived, actual, and reasons behind the competence level in General Mathematics of 410 Grade 12 students. The study employed a General Mathematics Competency test to measure the students’ actual competence, Rapid Competency Assessment Questionnaire to analyze students’ self-perceived learned competence; and, interview schedule for the reasons for having the acquired competence. Results showed that the three areas of General Mathematics that include Functions and their Graphs, Business Mathematics, and Logic were perceived to be satisfactory by the Senior High School students, but the actual acquired competence was fair. On the specific learning competencies, data revealed that there are commonalities on the perceived most learned competence to their actual competencies. However, data indicated a very weak positive relationship between them. Statistically, there was no correlation between the two variables. Moreover, data revealed that factors affecting students’ competence level revolved around the teacher, environment, low self-perception, and personal factors. The data indicated that senior high school students positively assess themselves in the learning of General Mathematics. However, the acquired competency

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PUBLIC INTEREST STATEMENT

The Philippines produced the first batch of graduates under the newly implemented K-12 curriculum in 2018. This curriculum aims to equip students with learning competencies making them prepared for higher education and careers. Thus, understanding the acquired competency of students is important to be addressed. This study investigates the self-perceived, the actual, and the reasons behind the competencies of senior high school students in general mathematics. Results revealed that students perceived mathematics as an easy and relatable subject. However, the actual competency showed that they have not yet mastered the necessary competencies in the subject matter. The low self-perception, the role of teachers, learning environment, and personal reasons were the identified factors behind the acquired competency of students. The study implies that appropriate educational interventions should be implemented in order to improve the actual competence and performance of students in general mathematics.
showed that they have not yet mastered the necessary competencies in the subject matter.

**Subjects:** Education - Social Sciences; Evaluation/ Program Evaluation; Program Evaluation

**Keywords:** least-learned competencies; assessment; perception; competence level

1. Introduction

Educators have started to realize the promise of competency-based education as a new structure to organize schools. It centers on real-world skills and competency development and designed to help the student successfully master skills in every step of the learning process (Curry & Docherty, 2017). In the Philippines, the K to 12 Curriculum promotes students to become prepared for higher education and careers by developing necessary lifelong learning skills such as problem-solving, communication, collaboration, teamwork, and persistence that are needed to master academic knowledge. Moreover, according to the Department of Education, it aims to produce students equipped with competencies in a holistic manner.

Competencies are combinations of demonstrable characteristics, knowledge, and skills that enable one to apply, complete and use a task according to its standards in a defined work area (Asfani et al., 2016). It also emphasizes the aspect of learning that applies within and across all subject areas. Luken (2004) defined competence as the ability to integrate knowledge, skills, and attitudes to achieve the set goals in concrete task situations. It can be scored and is measurable in which teachers can assess the students' competence through processes of observation and evaluation (self-perceived or objective) (Asfani et al., 2016).

Evaluating self-perceived competence has its advantages as it indicates the student's motivation in maintaining and improving the skills concerned, as self-perceived competence is proposed as one component in the concept of self-efficacy (Choi, 2005; Shen & Talavera, 2003). The effects of self-efficacy on student's learning and achievement of academic goals have been highlighted and determined. Students with high self-efficacy are confident to understand a lesson, to solve educational problems and able to complete a task (Ahmad & Safaria, 2013). They believe that they can understand and solve mathematical problems as compared to students with low self-efficacy (Ahmad & Safaria, 2013; Zajacova et al., 2005). Self-perceived competence can also be related to self-concept (Ferla et al., 2010), which refers to some mental representation that originated from experience as well as associated beliefs, attitudes, and conception concerning one's ability or performance (Mutodi & Ngirande, 2014). Students who are goal-oriented and who perceive themselves to have high academic competence may employ a learning strategy that is appropriate and adaptive to their learning needs (Cho et al., 2011). The same is observed for students with low self-perceived academic competence. The use of an adaptive learning strategy may help students with high self-perceived academic competence to perform significantly better than students with low self-perceived academic competence. Further, students with high self-perceived academic competence tend to adopt high-performance approach goals, which, in turn, enhance their academic achievement (Cho et al., 2011).

Psychologists believe that students' positive attitudes toward learning and positive self-perception of their competence have a great impact on their motivation and thus enhancing academic gain (Shen, 2002; Shen & Talavera, 2003). A convincing body of research has demonstrated that students' self-perceived academic competence influences student motivation, learning, and academic performance (Areeppattamani & Kaur, 2012; Ferla et al., 2010; Shen & Pedulla, 2000). This explains why judgments of self-perceived competence are a key component of motivation and learning theories. However, few studies have simultaneously researched the specific effects of different types of academic self-appraisals on higher education students' achievement goals, persistence, learning approach, and academic performance (Cho et al., 2011; Zisimopoulos & Galanaki, 2009).
Competency in mathematics learning is vital to any individual in scientific discoveries, technological breakthroughs, problem-solving, and decision making in different situations in life (Anigbo, 2016). Despite its importance, it is considered as the most dreaded to learners among all subjects offered in school. It is widely claimed that negative perceptions of mathematics are widespread among students at all levels (Mutodi & Ngirande, 2014). Students tend to respond to it with less confidence, negative feeling, and anxiety (Anigbo, 2016). One of the most notable consequences of mathematics anxiety is poor mathematics achievement and competence (as cited in Anigbo, 2016). Students who are infested with mathematics anxiety will lack the interest to learn mathematics, and consequently may tend to achieve poor performance in the subject (Anigbo, 2016).

The poor performance in mathematics in the country based on the recently concluded Programme for International Student Assessment (PISA) 2018 result can be attributed to students' lack of interest and negative perception towards learning mathematics (Schleicher, 2018). Interest has to do with preparedness or mastery of a subject matter that can enable the learner to cope with the next higher level of learning of the subject matter or related learning task (Anigbo, 2016). To enhance students' self-perceived competence in mathematics, mathematics teachers need to build students' confidence in their ability to do well in mathematics. As students may experience a feeling of autonomy and competence during instruction, they become intrinsically motivated toward school (Jang et al., 2010), thus, they tend to learn better and become more creative on tasks requiring conceptual understanding (as cited in Areepattamannil & Kaur, 2012).

Tailored to the basic competencies that the curriculum aims to develop to the students, an assessment of the graduates' acquired set of competence particularly in mathematics is necessary. Very few studies exist in the literature that examined the predictive relationship of self-perceived and actual competencies in mathematics. Hence, competency achievement becomes an essential issue to be addressed. With the full implementation of the curriculum, this study presents a holistic understanding of the current status of the students' acquired competencies in mathematics education. Moreover, it identifies the existing factors behind such competence which can be used as a basis for future educational reforms. This tries to inform what teachers and educators need to do more to provide academic and life-long learning. Given the importance of mathematical competence, this study aimed to analyze the relationship of the actual and self-perceived competence in General Mathematics among senior high school students in a public senior high school division in the Philippines of School Year 2017–2018. Also, it determined the reasons for obtaining such competencies and specifically addressed the following research questions:

1. What is the senior high school students' self-perceived competence in General Mathematics in the area:
   a) Functions and their graphs
   b) Business Mathematics
   c) Logic

2. What is the senior high school students' actual competency in General Mathematics in the area:
   a) Functions and their graphs
   b) Business Mathematics
   c) Logic
3. What are the most self-perceived learned competencies in General mathematics among senior high school students?

4. What are the most actual learned competencies in General mathematics among senior high school students?

5. Is there a significant relationship between senior high school students’ self-perceived and actual competency in General Mathematics?

6. What are the reasons of the students on their acquired level of competency?

2. Materials and methods

2.1. Research design
This study utilized a mixed-method research design. A descriptive correlational design and qualitative research approach were employed. The descriptive correlational research design allows the researchers to answer questions about the relationship between self-perceived and actual competencies to determine, describe, and explain certain phenomena (Lappe, 2000). Qualitative research is categorized as a systematic investigation of the meaning of an individual or the group attribute to a phenomenon of interest (Creswell, 2007). In the study, an in-depth interview via a focus group discussion was employed.

2.2. Study group
This study involved random samples of 410 senior high school students in seven public senior high schools of one school division of Department of Education Region 8, Philippines of School Year 2017–2018. These students were the ones who completed both instruments; the examination for their actual competence, and rapid competency assessment questionnaire for their self-perceived competency. All were grade 12 students during the conduct of the study. Information about the research was given to the senior high school students before the conduct and those who wanted to participate voluntarily were part of the research.

2.3. Study site
This study was conducted in seven public senior high schools of Baybay City Division, Baybay City, Leyte. It is located in the Eastern part of the Visayas Region in Central Philippines. A permission letter from the Baybay City Division Superintendent was secured by the researchers before the conduct of the study. The researchers also personally talked to the superintendent on the rationale of the research and suggested schedules for the conduct of the study. After she signed for its approval, we distributed copies to the principals involved. The section advisers of the student participants were also informed about it. Finally, the school principal with the section advisers approved the set schedule for the survey and the interview. They also provided the researchers with the classrooms as the survey and interview setting.

2.4. Data collection tool
To collect the data, there were three instruments used. The Rapid Competency Assessment Questionnaire, the 80-item researcher-made General Mathematics Competency Test, and Interview Schedule were utilized. All instruments utilized in the study were researcher-made.

2.4.1. Rapid competency assessment questionnaire
This instrument provided all the list of learning competencies in General Mathematics as stipulated in the K to 12 Senior High School Core Curriculum (Department of Education, 2016). The questionnaire was validated by eight experts in the field of Mathematics and Mathematics education. The students assessed their understanding of the said competency based on their perception by checking appropriate boxes with the following choices:
Score Description Interpretation

4.51–5.0 Excellent Students believed to have 91–100% mastery of the learning competency.

3.51–4.50 Very Satisfactory Students believed to have 71–90% mastery of the learning competency.

2.51–3.50 Satisfactory Students believed to have 41–70% mastery of the learning competency.

1.51–2.50 Fair Students believed to have 21–40% mastery of the learning competency.

1.00 - 1. 50 Poor Students believed to have 0–20% mastery of the learning competency.

2.4.2. General Mathematics competency test
This is used in assessing the Senior High School students’ actual competency in General Mathematics. This covered the learning competencies of the core subject-General Mathematics as stipulated in the curriculum guide of the senior high program. This was based on the Department of Education’s materials for teachers and learners such as the curriculum guides, learner’s materials including books either hard or soft copies.

General Mathematics was taught for 80 hours in a semester and the researcher allotted questions for all the learning competencies provided. In the table of specification, if a certain leaning competency was taught for 1 hour, one question was made for that competency. Moreover, if it was taught for 3 hours, there will be three questions for that competency at a different level of difficulty. This was done to cover all competencies which included Functions, Business Mathematics, and Logic as stipulated and to have a fair distribution of the questions in the exam. This test underwent face and content validity by eight Mathematics experts. After integrating the corrections, it was pilot-tested to Grade 12 students and found out that the KR 20 value is 0.788 for internal consistency.

The competency of the students was based on the point percentage the students got on the 80-item competency test. It was also described into levels which were also validated by experts, below are the levels:

Score Description Interpretation

84.01–100.00 Excellent Students got score ranging from 65–80 points

60.01–80.00 Very Satisfactory Students got score ranging from 49–64 points

40.01–60.00 Satisfactory Students got score ranging from 33–48 points

20.01–40.00 Fair Students got score ranging from 17–32 points

0.00 – 20.00 Poor Students got score ranging from 0–16 points

2.4.3. Interview schedule
This instrument used to guide the researchers in soliciting the reasons for the students acquiring the level of competency in General Mathematics. The interview schedule was validated and verified by two experts in Mathematics education and one expert in assessment and evaluation.

The participants were interviewed via focus group discussion. A focus group discussion is a type of in-depth interview executed in a group (Mishra, 2016). This allowed the researchers to collect direct information about the reasons for the students on acquiring a certain level of competency in General Mathematics.
2.5. Data analysis
The data was collected via a survey with 410 senior high school students from seven different senior high schools. The researchers personally administered the test and the questionnaire on the same day.

After the data collection, data had been analyzed using SPSS Version 21.0. Mean and standard deviation were used to describe the perceived and actual competence of senior high school students. Frequency counts were used to rank the most learned competency in General Mathematics. The Pearson-r correlation was utilized to test for the relationship between perceived and actual competence. P-value was set to 0.05.

Qualitative data were thoroughly coded to generate themes about the reasons for students in acquiring a certain level of competency in General Mathematics. In this study, compilation, organization, and transcription of data from the audiotaped interviews were executed. The findings were taken to the participants to confirm if the analyzed data corresponded with their given information. This process is completed to assure the accuracy of the data captured (Brantlinger et al., 2005; Creswell, 2014).

In the analysis of qualitative data, thematic analysis was employed. Braun and Clarke (2006) define thematic analysis as a method that identifies, analyzes, and reports recognized themes based on the generated data. Researchers engage in this method because it helps them to describe and organize the obtained data in a detailed manner. This qualitative data analysis method is accessible, flexible, and increasingly popular (Braun & Clarke, 2012). In this study, after data transcription, the researchers familiarize and immerse themselves in the gathered data. After this, initial codes were generated in order to explore themes. Reviewing of potential themes followed, then finally defining and naming those.

2.6. Ethical procedures
The researchers adhered to all ethical procedures before and during the conduct of the study. The researchers were permitted by the Baybay City Division Superintendent to assess the students’ perceived and actual competency in General Mathematics and conduct the focus group discussion. The selected participants were assured that the data that will be gathered would have no bearing on their grades in Mathematics, are strictly confidential, and for research purposes only. Also, the participants were not subjected to any harm. Respect for the participants was guaranteed via informed consent. Details about the study, the processes to be undertaken, and interview questions were explained well to the students together with the section advisers. Those who participated were purely voluntary in nature. In this study, pseudo names based on numbering (Student 1–410) were used.

3. Results and discussion
3.1. Self-perceived and actual competency in General Mathematics
The descriptive statistics of the self-perceived competence of the students in General Mathematics are presented in Table 1. Results indicate that the overall self-perceived competency was satisfactory ($M = 2.73, SD = 0.66$). Also, it is revealed that Function and their graphs, Business Mathematics, and Logic areas were also perceived as satisfactory. Based on the findings, students perceived to have 41–70% mastery of the learning competency in all areas in General Mathematics.

To determine the actual competency, Table 2 presents the actual competency of senior high school students in the three areas of General Mathematics. Data revealed that the overall actual competency was fair ($M = 31.17, SD = 8.24$). Also, the students’ actual competency in the following topics; Function and their graphs, Business Mathematics, and Logic areas were fair. Findings indicate that based on students’ actual test results, they acquired 16–32 points out of 80 in the administered General Mathematics competency test.
Moreover, results showed that the self-perceived competence of the students is higher than the actual competency. This means that the actual academic performance of the students in general mathematics is generally lower than what the students believed or perceived to themselves. This argues with the claim that greater self-perceived academic competence would enhance students’ intrinsic motivation, thus, promote academic performance (Zisimopoulos & Galanaki, 2009). It is supported by Areepattamannil and Kaur (2012) that self-perceived academic competence precedes intrinsic motivation. However, the opposite was indicated in the findings.

3.2. Self-perceived and actual learned competency

Table 3 highlights the top 10 most self-perceived learned competencies of senior high school students in General Mathematics. Data shows that eight competencies were from the area Functions and their graphs with performing addition, subtraction, multiplication, division, and composition of functions competency topping on the list. Two competencies were from the Business Mathematics area, and none comes from the Logic area. This implies that students perceived the competencies of Functions and their graphs to be easier and more understandable than the lessons in Business Mathematics and Logic.

In the same manner, the most learned competencies in general mathematics were determined based on the obtained actual test result. Table 4 shows the identified learning competencies in each topic. Six (6) competencies were covered in the area of Functions and their graphs with evaluating a function competency topping on the list. While three (3) competencies were from the Business Mathematics area, and one (1) comes from the Logic area. This indicates that students acquired better competencies in the area of Functions and their graphs followed by Business Mathematics and Logic areas.

Results on actual and self-perceived competencies of the students represent similarities. It is shown that three of the learning competencies that the students perceived as easy are supported...
Table 3. Ranking of Self-Perceived Learned Competencies in General Mathematics

| Learning Competencies                                                                 | M   | Rank |
|---------------------------------------------------------------------------------------|-----|------|
| Performs addition, subtraction, multiplication, division, and composition of functions | 3.29 | 1    |
| Represents a rational function through its: (a) table of values, (b) graph, and (c) equation | 2.92 | 2    |
| Evaluates a function.                                                                  | 2.91 | 3    |
| Finds the domain and range of a rational function.                                     | 2.89 | 4    |
| Solves problems involving functions.                                                   | 2.88 | 5    |
| Solves problems involving simple and compound interests.                               | 2.86 | 6    |
| Represents real-life situations using functions, including piece-wise functions.       | 2.85 | 7    |
| Graphs rational functions.                                                             | 2.83 | 8    |
| Solves rational equations and inequalities.                                            | 2.82 | 9    |
| Illustrates simple and general annuities.                                              | 2.82 | 10   |

Table 4. Ranking of Actual Learned Competencies in General Mathematics

| Learning Competencies                                                                 | M   | Rank |
|---------------------------------------------------------------------------------------|-----|------|
| Evaluates a function                                                                  | 67.32 | 1    |
| Distinguishes rational function, rational equation, and rational inequality           | 58.29 | 2    |
| Solves problems rational function, equations, and inequality                          | 55.37 | 3    |
| Distinguishes logarithmic function, logarithmic equation, and logarithmic inequality. | 48.29 | 4.5  |
| Analyzes the different market indices for stocks and bonds.                           | 48.29 | 4.5  |
| Illustrates business and consumer loans                                               | 45.61 | 6    |
| Solves rational equations and inequalities                                            | 43.66 | 7    |
| Justifies mathematical and real-life statements using the different methods of proof and disproof. | 42.44 | 8    |
| Computes interest, maturity value, future value, and present value in simple interest and compound interest environment. | 41.22 | 9    |
| Solves problems involving simple and compound interests.                              | 40.73 | 10   |
by their actual competency. Topics on Functions and their graphs specifically on identifying, evaluating, and solving functions were three of the topics in common. This can be due to the reason that these topics are discussed in the first chapter, which are taught in the first month of the semester. On Business Mathematics, topics that were listed first on the curriculum guide were perceived to be easier by the students. This is also supported by their actual competency. Logic is the area where students find it difficult and this could be because it was discussed in the later months the semester. The data presented support the findings of Mamolo (2019a) where the students’ least learned topic in General Mathematics is more on logic. Three logic lessons were part of the top five least learned competencies.

3.3. Relationship between self-perceived and actual competency

The table below examines the relationship between two measurable variables. Table 5 reveals the correlation between the self-perceived and the actual competency of senior high school students in General Mathematics. Using Pearson r correlation, results indicate that there is no significant relationship between the perceived and actual competence ($p = 0.0807, r = 0.12$). This implies that students’ self-perception on their learning in General Mathematics has no significant association with what they have acquired and learned in school.

The study revealed that the self-perception of the students in general mathematics could not be associated with their actual competency. This can also be supported by the fact that students perceived their learning to be satisfactory, but their actual academic competence is fair. This implies that self-perceived competence has a differing association and effect on learning and academic performance. Ferla et al. (2010) emphasized that students reflecting high scores on the measures of self-perceived competence are more persistent and more likely to adopt mastery and performance-approach goals. Moreover, they are less anxious, process the learning material at a deeper level, and achieve better study results. However, it was also warned that high self-perceived competence, if not accompanied by a mastery goal orientation, can turn into over-confidence, resulting in lower persistence levels and poorer study results (Ferla et al., 2010).

The result of this study contradicts the findings of several studies that revealed a positive influence of self-perceived competence in mathematics (Areepattamannil & Kaur, 2012; Mutodi & Ngirande, 2014) and reading ability (Lynch, 2002) on academic achievement. However, Shen and Talavera (2003) present a consistent negative effect of students’ perceived easiness in both math and science on their actual achievement scores in both subjects. Miller et al. (2004) studied self-perceived competence as a predictor for chemistry exam scores and found no significant relationship.

The results could also be explained by the concept of the didactic contract of Brousseau (1997). The “satisfactory” self-perceived competency of the students may be due to the way the teacher positively starts teaching the subject matter. However, as days go by, the high expectations of the students in learning the concepts may have declined by the way the teachers execute their role in instruction. The teachers may not have performed what they are expected to execute. This could be the reason for the “Fair” actual competency of the students.

| Group      | Mean Score | Description | R     | p-value |
|------------|------------|-------------|-------|---------|
| Self-Perceived | 2.73       | Satisfactory| 0.12  | 0.807   |
| Actual     | 31.17      | Fair        |       |         |
On the other hand, the teachers may have set standards and performed their duty, but the students may not have executed their role in the teaching-learning process, which became the reason why they acquired the competency. Trouche (2005) shares that students may get annoyed once they come to a point in which they, including the teacher, do not know. Students may feel that the teacher is not performing his duty. The same feeling of annoyance is felt by the teacher when students did not do their responsibilities under the didactic contract. As explained by Pierce et al. (2010), the didactic contract refers to responsibilities and expectations that teachers and students are expected to reciprocate related to mathematical knowledge.

### 3.4. Students’ reasons for their acquired level of competency in General Mathematics

Using a qualitative method, a deeper understanding of the phenomenon will be realized (Mamolo, 2019). Based on the responses of the students in the focused group discussions and written interviews, four themes emerged. These were formulated to describe the reasons of the students on their acquired level of competency. The themes include the following; (a) Negative perception and lack of self-confidence in Math, (b) unconducive classroom environment, (c) ineffective and inefficient instruction, and (d) students’ personal reasons.

#### 3.4.1. Negative perception and lack of self-confidence in Math

The results of the focus group discussion present two reasons for the students on acquiring a certain level of competency in General Mathematics. The first reason is, a pessimistic view of themselves in learning the subject and second is, the lack of self-confidence towards the subject matter. The majority of the students responded that they hate Mathematics subject. According to them, it was never their favorite subject and they are slow learners. That is why; they do not learn. Some of the responses of the students are the following:

Student 1 commented:

“I do not like Math. I am very dull in Math, and it is not my favorite subject”.

The same feeling was expressed by Student 8:

“I do not like Math, and I felt so bored.”

Student 50 said:

“I learn very slowly if we talk about Math because I hate numbers ever since. I am not used to computation; that’s why; all topics seem difficult to learn. I did not focus on listening and understanding the topic. Honestly, I never study because I hate math”.

That’s why they don’t feel any excitement in the subject matter and get sleepy in the class because they were uninterested to learn.

Student 5 stated:

“It is hard. Memorizing equations and familiarizing them makes it harder for me especially when identifying graphs and functions. I do not know why I find it hard and uninteresting. Also, I am bored to the point that I do not listen to the teacher’s discussion and rather sleep”.

Moreover, the majority of the students think that they don’t have the critical and problem-solving skills needed. That is why; they perceive General Mathematics as a difficult subject.

Majority of the students commented:

“General Mathematics is more on analytical problems that is why; it is very hard to understand.”
It is supported by student 90 and 120 who emphasized:

“Analysis is not my strength. Mathematics is more on analysis where you need to read and understand the given problem critically; hence, it is difficult”.

“General Mathematics requires analysis and more on problem-solving. This is the reason why it is so tiring to read. Some Mathematics problems are stated in long sentences, which seem difficult to analyze, not knowing that the solution to the answer is just short”.

Moreover, this study found out that senior high school students have a negative perception and lack of self-confidence towards mathematics. Findings present that students perceived mathematics as a difficult subject that requires higher-order thinking skills. This is the reason why their performance is low, which eventually makes them dislike the subject. The study illustrates that negative perception of students and lack of self-confidence towards the subject result in a negative impact on students’ performance.

Mazana et al. (2019) cited that when students possess a positive attitude and high self-confidence, they are likely to overcome the fear of failing. The study implies that it is vital that students should develop their self-confidence and have the initiative to study, read, and practice solving in mathematics to overcome such negative perceptions.

Teachers have a significant role to play in addressing such issues. Teachers should appropriately use instructional methods that can enhance the interest and enjoyment of the students towards the lesson taught. Moreover, teachers should also create a mutual understanding and non-threatening teaching and learning environment (Mazana et al., 2019). Teachers should develop confidence in students as far as mathematics performance is concerned and create the most favorable ways to facilitate learning so that students can appreciate and love the subject (Pontian, 2018).

3.4.2. Unconducive classroom environment
The data revealed that having a classroom environment that does not favor optimum learning is one of the reasons why students acquired only a “fair” level of competency. It is one of the problems encountered in the teaching-learning process. Moreover, it was found out that students can barely listen to the discussions because of the overcrowded classroom causing the noise. The following were some of the responses:

Student 8 stressed:

“There are many obstacles in learning the subject matter. For example, the room is too crowded and too hot.”

The same is expressed by student 150:

“The problem that I encountered is that, and I can barely listen to the discussion because we are 70 students in the classroom. I never expected such noise which disturbs the class”.

Moreover, student 100 elaborated:

“In our classroom, we are more than 100 students. It is very crowded! It is very noisy! Four classes were being held together in a school building so we can barely listen. That is why; we have not learned at all.”.

The students also emphasized that on-going building constructions distracted them. This makes it challenging to learn and understand the topics discussed.
The results of the study presented that creating a conducive learning environment is one of the important concerns that every educator needs to address. It plays a significant role in shaping the quality of academic performance in mathematics. Kamaruddin et al. (2009) found out that a learning environment that includes school-teacher interaction has a positive relationship with students’ academic performance.

Students’ performance would improve upon the provision of the adequate conducive school environment with an emphasis on facilities like the classroom. It was also revealed that good indoor air quality, good visual comfort, and sufficient learning space are the fundamental factors that can affect student learning outcomes (Okafor et al., 2016). The physical characteristics of the school are also one of the issues raised by the students that significantly affect their learning in mathematics. Santos (2019) stressed out that the physical facilities have a negative impact on the teaching-learning process, and that can lead to absenteeism of students and poor performance teachers.

The responses of the students with regards to their learning experience imply the need to create a friendly and conducive learning environment. Educators must aim that upon coming to school, students should be excited to learn and feel comfortable in everything they do in school. Crogman et al. (2015) emphasize that comfortable students are happy and productive. Moreover, the findings present that students would learn better and acquired a better competency in general mathematics once the school and other learning conditions that would promote comfort and serenity are provided.

3.4.3. Ineffective and inefficient instruction
From the data gathered, most of the students pointed out that teachers were also one of the reasons they acquired a “fair” level of competency. Most of them said that the teacher did not discuss several topics. Moreover, students also commented that there were teachers who incurred many absences in class. Also, if the teacher is present, they keep on writing notes without a follow-up discussion. Moreover, some of the topics are not discussed because their teachers are busy doing other activities in school. The following responses of the students support the issue.

Student 68 said:

“I only learned a few things because our teacher always lets us take notes. Only seldom that she conducts a class”.

Student 105 and 110 shared:

“We do not know and understand the topic because we do not have serious classes. Our teacher seldom comes to class. If she is around, she doesn’t conduct a class. That is why; we do not have enough learnings about the topic”.

Also, if the teachers discussed the concept, the pacing was fast. This makes the students do not understand the concepts tackled. It was also emphasized that the teachers’ way of discussing the lesson made the subject more difficult. Moreover, some teachers are very strict in teaching. Some of their responses were:

Student 12 said:

“I do not understand because our teacher discusses the concept fast.”

Student 140 emphasized:

“The teacher discussed it fast and did not explain well. He did not discuss it in a step by step manner. Also, she is strict”.

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Student 56 shared:

“The teaching strategies used by our teacher make it more difficult for us to learn. He also discusses fast, which leads us to not learning the lessons well”.

Also, the voice of the teacher is another factor that the students highlighted. They emphasized that they can’t hear the discussion well because of the very soft voice of their teacher. Hence, they can’t learn.

Most of the students commented:

“The problem is our teacher, who has a low voice quality. It is one of our reasons why instead of listening, we rather sleep. We didn't listen to the discussions because of the very soft voice of our teacher”.

Furthermore, some students pointed out that the medium of instruction used by their teacher hindered them from truly understanding what was being discussed. The following are some of their comments.

Student 7 said:

“Our teacher uses uncommon terminologies and difficult to comprehend English words; hence, we find it hard to understand.”

The same feeling expressed by student 3:

“Having a soft voice (of the teacher) and the use of words is not comprehensible”.

Moreover, student 80 shared:

“The way the teacher enunciates his word is not understandable”.

The findings of the study present that the role of the teacher in the classroom is essential and crucial in attaining positive student outcomes. Kiplagat et al. (2012) cited that learning mathematics depends primarily on the teachers wherein their task is to impart attitudes, concepts, knowledge, and skills to the learners. The quality of learning largely depends on the quality of teaching (as cited in Crogman et al., 2015). Thus, teacher quality is related to student academic performance (Toropova et al., 2019). Indicators of teacher quality in mathematics include methods of teaching used, effectiveness in teaching, teacher's attitude towards mathematics, and years of experience (Goldhaber & Anthony, 2003; Toropova et al., 2019). Teachers should be responsible for the interpretation of learning to the students and be committed to the use of appropriate teaching methods. Also, teachers must establish a conducive atmosphere/environment for learning, use appropriate learning resources, and conduct a proper assessment of learning (Kiplagat et al., 2012).

Crogman et al. (2015) emphasized that teachers should be knowledgeable in applying the various teaching methods and be flexible enough to have the ability to engage students in the classroom. Mathematics teachers should also adapt ways of teaching wherein it can create an interactive atmosphere conducive to mathematics learning, and can improve students' participation and performance in the classroom. Students perform and achieve maximum learning when they are exposed to a learning environment that could embark on discoveries and construct knowledge (Crogman et al., 2015).

Moreover, Crogman (2017) elaborated another factor which is vital in critical thinking processes. He highlighted how language bridges structured thinking. Hence; the language used by the teacher
in explaining the concepts must be well understood by the students. This helps students to fully understand the concepts. A teacher being able to interact with the students and show positive behavior increases students’ motivation towards learning and academic success (Ulug et al., 2011). Such positive behavior includes asking questions, understanding their ideas, display interest, and appreciation and realizes the nature of knowledge and abilities.

3.4.4. Students’ personal reasons

Students’ personal and family problems were some of the reasons for acquiring a certain level of competency. They emphasized that they usually forget the concepts and formula to be used during examinations because they are confused when and what to use the formula.

Majority of the students said:

“General mathematics is easy and understandable, but, with the many formula, it is difficult during exams because we do not know what formula to be used”.

The students also emphasized that they didn’t listen during class discussions. The lack of interest of students towards the subject and to the teacher is evident and manifested in their responses. Students shared that they wanted to talk to their seatmates because they felt bored/sleepy in the class.

Students expressed:

“We do not listen to the discussion because we feel like we are going crazy about it. So, instead of listening, we get to talk to our seatmates. Also, we slept in class because we do not want the teacher”.

Moreover, they were preoccupied with many other subjects offered in the curriculum, along with various projects/activities being assigned to them.

Student 9 noted:

“We are preoccupied with the other things like projects of the other subjects. We do not have math subjects now; that is why; it is no longer our focus. For example, our computer subject is our main priority because we will have an incoming practical examination. Hence, math is not our priority”.

Student 86 said:

“I cannot listen during the discussion because I am doing other things for the other subjects during the class.

The students also highlighted that their late attendance and absences in the class were due to sickness/illness, problems in the family, and activities in the school. Other reasons like watching NBA and playing computer games were also emphasized.

Student 17 shared:

“I have not learned from my class because I always cut classes to play computer games and watch NBA finals. Also, I am late in class most of the time”.

Student 92 expressed:

“I got sick and confined in the hospital for a few days; that’s why; I was absent and missed several topics. I also had the difficulty catching up the lessons”.

Student 12 emphasized:
“Maybe I was absent, joined school contest, or did not listen to the teacher. I also have forgotten those concepts discussed”.

Other reasons that were elaborated by the students that made them perceive that General Mathematics is difficult are due to their work schedules and lack of foundation in the subject matter. Some of their responses are presented below.

Student 390 said:

“I do not understand the class discussions because before I come to school, I went from work. That is why; it is hard for me”.

Student 123 also emphasized:

“I do not listen to the class discussions because of the stress I got from work. It is very tiring when I am working in the day and study at night. When I am at school, I tend to sleep. I am also unmotivated to listen to the teacher”.

Student 60 shared:

“I find General Mathematics difficult since I do not have a solid foundation in algebra and other fields in Mathematics.”

The low competency obtained in the subject was accounted for the personal viewpoint of students. Students who have low performance were found to have personal problems that cause them to leave school. Such problems include; financial and socioeconomic status, the thought that school was difficult for them, and the lack of seriousness and focus in their studies (Moore, 2017). These findings also support that of Chua (2015), who stressed that the weak foundation of students in Math, together with cases of absenteeism, tardiness, and high drop-out rates, was the concern of the teachers during the implementation and modeling of the senior high school program.

Moreover, the personal reasons presented by the students support the study of Espino et al. (2017). He concluded that the causes of students’ mathematics anxiety are the teachers, students’ perception and attitude towards Mathematics, students’ experiences in attending math class, and taking math exams. It was also observed that teachers were mostly laid the blame by the students’ lack of interest and motivation towards the subject, the lack of career foresight of students, and the nature of mathematics subject (Kafakunesu et al., 2011).

4. Conclusion and recommendations

The findings present a holistic understanding of the existing educational practices in mathematics instruction that may be used as the basis for educational reforms. The results revealed that students’ perceived competence has no relationship to their actual competency. Students perceived General Mathematics as an easy to average subject. However, the result was found to be incongruent to their actual competency. In this case, the students or the teachers may have not executed what they were expected to perform under a didactic contract. Moreover, factors such as negative perception and lack of self-confidence of students, not conducive learning environment, ineffective and efficient teaching, and students’ personal reasons were identified as the primary reason behind the low competency of students towards general mathematics. The findings of the study are supported by researches that concluded that students’ learning and performance in mathematics are influenced by several factors such as students’ attitude (Capuno et al., 2019; Kanafiah & Jumadi, 2013) and perceptions toward the subject (Pontian, 2018), teachers’ instructional methods and practices (Enu et al., 2015; Inkeeree et al., 2017; Mazana et al., 2019) and school environment (Kamaruddin et al., 2009; Okafor et al., 2016; Shamaki, 2015). Such issues can be reconciled if the identified factors will be dealt with accordingly in instruction.
This study implies that there is a need to develop and implement appropriate educational interventions to enhance the interest and motivation of students to improve the actual competence and academic performance in mathematics. Sugano et al. (2019) emphasize that teachers need to exert more effort to provide quality instruction and new systems of assessing teacher’s teaching to make necessary adjustments and pedagogies. Moreover, it calls to establish teacher training programs focusing on the content and pedagogical knowledge to improve the teaching-learning process as this entails a reformation program for all teachers. The results also strengthen the mandate of the Department of Education to provide a more conducive classroom environment for students.

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References
Ahmad, A., & Safaria, T. (2013). Effects of self-efficacy on students’ academic performance. Journal of Educational, Health, and Community Psychology, 2(1), 22–29. https://www.researchgate.net
Angbho, L. C. (2016). Factors affecting students’ interest in Mathematics in secondary schools in Enugu state. International Journal of Education and Evaluation, 2(1), 22–28. www.iiardpub.org
Areeppattamannil, S., & Kaur, B. (2012). Influences of self-perceived competence in Mathematics and positive affect toward Mathematics on Mathematics achievement of adolescents in Singapore. Mathematics education: Expanding horizons (Proceedings of the 35th annual conference of the Mathematics Education Research Group of Australasia), Singapore: MERGA.
Asfani, K., Suswanto, H., & Wilobaya, A. (2016). Influential factors of students’ competence. World Transactions on Engineering and Technology Education, 14(3), 416–420. http://www.wiete.com.au
Braun, L., Jimenez, R., Klingen, J., Pugach, M., & Richardson, V. (2005). Qualitative studies in special education. Exceptional Children, 71(2), 195–207. https://doi.org/10.1177/001442120507100205
Braun, V., & Clarke, V. (2012). Thematic analysis. In H. Cooper, P. M. Camic, D. L. Long, A. T. Panter, D. Rindskopf, & K. J. Sher (Eds.), APA handbook of research methods in psychology, Vol. 2: Research designs: Quantitative, qualitative, neuropsychological, and biological (pp. 57–71). American Psychological Association.
Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. Qualitative Research in Psychology, 3(2), 77–101. https://doi.org/10.1080/1478088060063004
Brousseau, G. (1997). Theory of didactical situations in mathematics: didactique des mathe´matiques (N. Balacheff, M. Cooper, R. Sutherland, & V. Warfield (Eds., & Trans.)). Kluwer Academic Publishers
Capuno, R., Necesario, R., Etuc, J. O., Espina, R., Padillo, G., & Maguillmon, R. (2019). Attitudes, study habits, and academic performance of junior high school students in Mathematics. International Electronic Journal of Mathematics Education, 14(3), 547–561. https://doi.org/10.29333/ejmme/5768
Cho, Y., Weinstein, C. E., & Wicker, F. (2011). Perceived competence and autonomy as moderators of the effects of achievement goal orientations. Educational Psychology, 31(4), 393–411. https://doi.org/10.1080/01443410.2011.560597
Choi, N. (2005). Self-efficacy and self-concept as predictors of college students’ academic performance. Psychology in the Schools, 42(2), 197–205. https://doi.org/10.1002/pits.20048
Chuo, V. C. (2015). Assessment of the Mathematics curri culum in the SHS modeling program. https://www.researchgate.net/publication/281401631
Creswell, J. W. (2007). Qualitative inquiry & research design: Choosing among five approaches (2nd ed.). Sage.
Creswell, J. W. (2014). A concise introduction to mixed methods research. Sage.
Crogman, H. (2017). Grasping the interplay between the Verbal Cultural diversity and Critical thinking, and their Consequences for African American education. Frontiers in Education, 2(1), 1–16. https://doi.org/10.3389/feduc.2017.00064
Crogman, H., Crogman, M. T., Wriner, L., Mustafa, A., & Peters, R. (2015). Developing a new teaching paradigm for the 21st century learners in the context of Socratic methodologies. British Journal of Education, Society & Behavioural Science, 9(1), 62–95. https://doi.org/10.1974/SBS/2015/17625
Curry, L., & Dockerty, M. (2017). Implementing Competency-based education. Collected Essays on Learning and Teaching, 10, 61–73. Retrieved from ERIC Database. EJ1147189
Department of Education. (2016). K to 12 basic education curriculum senior high school. Core subject. https://www.deped.gov.ph
Enu, J., Agyma, O. K., & Nkum, D. (2015). Factors influencing students’ mathematics performance in some selected colleges of education in Ghana. International Journal of Education Learning and Development, 3(1), 68–76.
Espino, M., Pereda, J., Recon, J., Perculeza, E., & Umaiil, C. (2017). Mathematics anxiety and its impact on the course and career choice of grade 11 students. International Journal of Education, Psychology and Counselling, 2(5), 99–119. http://www.ijpc.com
Ferla, J., Valcke, M., & Schuyten, G. (2010). Judgments of self-perceived academic competence and their differential impact on students’ achievement motivation, learning approach and academic performance. European Journal of Psychology of Education, 25(4), 519–536. https://doi.org/10.1007/s10212-010-0030-9

Goldhaber, D., & Anthony, E. (2003). Indicators of teacher quality. ERIC Clearinghouse on Urban Education.

Inkeeree, H. K., Fauzee, M. S., & Othman, M. K. H. (2017). The effect of students’ confidence level toward Mathematics performance among southern Thailand primary school children. International Journal of Academic Research in Progressive Education and Development, 6(2), 20–34. https://doi.org/10.6007/IJARPED/v6-i2/2934

Jong, H., Reeve, J., & Deci, E. L. (2010). Engaging students in learning activities: It’s not autonomy support or structure, but autonomy support and structure. Journal of Educational Psychology, 102(3), 588–600. https://doi.org/10.3200/JBPM.94.4.588-596

Kafokunusu, M., Chinyoka, K., & Ganga, E. (2011). Finger-pointing in mathematics education: Causes of drop-outs in high school mathematics in Masvingo urban, Zimbabwe. Semantic Scholar Psychology.

Kamaraiddin, R., Zainal, R., & Aminuddin, M. (2009). The quality of learning environment and academic performance from a student’s perception. International Journal of Business and Management, 4(4), 171–175. https://doi.org/10.5539/ijbm.v4n4p171

Konafliš, S. F., & Jürami, A. (2012). Students’ perception towards Mathematics: Attitudes, interest and lecturers’ teaching. International Symposium on Mathematical Sciences and Computing Research 2013.

Kiplagat, P., Role, E., & Makewa, L. N. (2012). Teacher commitment and mathematics performance in primary schools: A meeting point. International Journal of Development and Sustainability, 1(2), 286–304. www.isdsnet.com/ijds

Lappe, J. M. (2000). Taking the mystery out of research: Descriptive correlational design. Orthopaedic Nursing, 19(2). https://dspace2.creighton.edu/xmlui/handle/19591/4792

Lukem, T. (2004). Are competencies measurable? Dilemma and escape in operationalizing the competence concept. Tijdschrift voor hoger onderwijs, 22, 1. Academia.edu

Lynch, J. (2002). Parents, self-efficacy beliefs, parents’ gender, children’s reader self-perceptions, reading achievement and gender. Journal of Research in Reading, 25(1), 54–67. https://doi.org/10.1111/j.1467-9817.2001.00158

Mamolo, L. (2019). Analysis of senior high school students’ competency in general Mathematics. Universal Journal of Educational Research, 7(9), 1938–1944. https://doi.org/10.13189/ujer.2019.070913

Mamolo, L. (2019a). Development of Digital Interactive Math Comics (DIMaC) for senior high school students in general Mathematics. Cogent Education, 6(1), 1689639. https://doi.org/10.1080/2331186X.2019.1689639

Mazana, M. Y., Montero, C. S., & Casimir, R. O. (2019). Investigating students’ attitude towards learning Mathematics. International Electronic Journal of Mathematics Education, 14(1), 207–231. https://doi.org/10.29333/iemj/3997

Miller, V., Oldfield, E., & Bulmer, M. (2004). Peer-assisted study sessions (PAS) in first-year chemistry and statistics courses: Insights and evaluations. In Proceedings of the Scholarly Inquiry in Flexible Science Teaching and Learning Symposium (pp. 30–51). UniServe Science.
Zajacova, A., Scott, M., Lynch, S. M., & Espenshade, T. J. (2005). Self-efficacy, stress and academic success in college. Research in Higher Education, 46(6), 132-143. https://doi.org/10.1007/s11162-004-4139-z

Zisimopoulos, D., & Galanaki, E. P. (2009). Academic intrinsic motivation and perceived academic competence in Greek elementary students with and without learning disabilities. Learning Disabilities Research and Practice, 24(1), 33–43. https://doi.org/10.1111/j.1540-5826.2008.01275.x