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Article

Working and Non-working Learners in Math: Basis for Utilizing Strategic Intervention Materials

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Abstract: The performance of the students in academics depends on many different factors. One of these factors is the economic status of their families. Education in public schools, though it is free, some parents cannot afford to send their children to school due to financial constraints. Education as a free is every individual's right in society, but it becomes a privilege because of a lack of financial support. This research work is a comparative study of students' or learners' performance in mathematics among students from working and non-working. This research article's ultimate objective is to investigate and compare a significant difference in their performance in the subject mathematics. The research methodology utilizes a t-test to analyze and synthesize primary data sources collected via interview and academic records, and diverse literature on the study area. However, the research findings revealed no significant difference in the two groups (the working and non-working group of learners). Therefore, it is recommended that secondary schools should be provided with adequate books and facilities and faculty school interventions and programs and promote the usage of SIM or Strategic Intervention Materials for learning and memory enhancement among learners.

Keywords: Working Student, Mathematics, Strategic Intervention Materials, SIM, Classroom, School Management.

1. Introduction

Learners nowadays are sensitive about their family economic situation and know how important Education is. Social or economic status is most commonly determined by combining parents' educational attainment, occupational status, and income [8]. That is why some students do something in their simple way to send themselves to school. They learned how to earn even just a little amount of money to spend for their academic needs at a young age. Jeynes (2002) further noted that in most of the studies done on students' academic performance, it is not remarkable that social, economic status is one of the major factors studied while predicting academic performance. They work while they are studying. According to Graetz [9], as cited in Justice, Osei, and Daniel (2015), one's educational achievement hinge on very strongly on the social-economic status of the parents. Considene and Zappala (2002) [10] argue that families where the parents are advantaged socially, educationally, and economically nurture a high level of achievement in their children.

Mathematics is a subject that has an important function in daily life [1]. This subject tackles everything in society. It is considered one of the hard and difficult subjects in the four corners of the room. According to Ramirez et al.,[30] it was common to perceive mathematics as a difficult subject and some students avoided solving mathematical problems. Working students realized how important Education and how hard it is to earn a living is why they give their best shot every time they come to school. Scholars agree that students' academic

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achievement is a 'net result' of their cognitive and non-cognitive attributes [2,3] as well as the sociocultural context in which the learning process takes place [4,5]. Teachers must inform of the nature of their students. Hanushek [11], as cited in Justice, Osei, and Daniel (2015) [12], estimated that the disparity among having a good teacher and having a bad teacher did go beyond one grade level equivalent in annual achievement growth. They must be sensitive enough about the performance of each of their students. Teachers in Mathematics must be more considerate of why some students are frequently absent from the class. For the working students to cope with the lessons, the teacher should intervene to help those students. Academic buoyancy is a construct relevant to students' schooling lives, defining how they overcome or 'bounce back' from everyday academic adversity [6].

Teachers appreciate how important it is to be patient with the student's behavior inside the class and understand why some students are frequently absent. The mathematics teacher must intervene to help the working students to cope up with the lessons. Findings will help students. Findings will help students realize that their absences can lead them to low performance in the mathematics class. According to the National Research Council (2000) [13] as cited in Akey (2006) [14], Students' beliefs about their ability and their outlooks for triumph in school have been openly linked to their levels of rendezvous, as well as to emotional states that promote or interfere with their ability to be academically successful. They have to let their teachers know why their absences are given a chance to cope with the lessons. Therefore, math teachers must maintain positive mindsets towards mathematics for good execution in the upper classes [15]. The parents realize that they have to be proud of their children who are working students. Parents, the broader family, peer groups, community influences, schools, and other societal bodies (e.g., churches, clubs) are all implicated in influencing children's progress towards their self-satisfaction and nationality. Of course, the children themselves with their distinctive abilities, temperaments, and propensities play a central role in forming and reforming their behavior, aspirations, and achievements [15]. Sometimes they have to praise their children if they pass or get a good grade from the mathematics subject despite being bothered by financial constraints. According to the Harvard Family Research Project (2006) [17], Substantial research supports the importance of family involvement in the Secondary school years. A growing body of intervention evaluations demonstrates that family involvement can be strengthened with positive results for children and their school success. Further, studies have also verified a correlation between parent involvement and children's educational development and subsequent intrinsic academic motivation (Gottfried, Fleming, & Gottfried, 1994 [18] as cited in the Centre on Education Policy, 2012) [19].

The school administrator will help the school design a program or interventions for students by teachers, which will improve learners' performance and do something to support those poor but deserving students for Education. Identifying the things that determine academic performance is an essential part of educational research [23]; thus, according to Luciano et al., [26] performance target must be set, and teachers who have attained such a target must be rewarded. This paper focuses on the difference between the performance in mathematics of working and non-working students. The study is limited only to the performance in the first grading period of the working and non-working studentsof Malacañang High school, Sta. Rosa, Division of Nueva Ecija. This paper focuses on the difference between the performance in mathematics of working and non-working students. The study is limited only to the performance in the first grading period of the working and non-working students of Malacañang High school, Sta. Rosa, Division of Nueva Ecija in the School Year 2018-2019.

It is expected that working students' performance is lower than the non-working students, most especially in mathematics subjects for this subject is considered the most difficult. Discovering information from existing academic-related data is a crucial aspect of educational research [7]. A working student might have a greater number of absences in the class while the non-working student is always present and provided with everything he/she needs in school. A student must have patience in learning the said subject. It is somewhat abstract, and many students hate this. A student must try a constant practice of every topic to be able to understand it fully. One cannot learn it alone without more knowledge about the subject than the student to learn it well. This study is aimed to determine if there is a significant difference in the performance in mathematics of

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working and non-working students of Malacañang High School for the First Grading period of the School Year 2018-2019 and to propose a Strategic Interventions Material Plan for specific topic.

2. Materials and Methods

The study was conducted at Malacañang High School at Brgy. Malacañang, Sta. Rosa, Nueva Ecija. According to Orodho (2008) [22], specifying the targeted study is important for research to make decisions on sampling and resources to use. The study's data were the grades in the first grading period of working and non-working students of Malacañang High School school year 2018-2019. The data gathered were the grades of the 12 workings and 12 non-working students selected randomly in different grade/year levels of the same sections for the first grading period of the school year 2018-2019. This research study utilized the survey research design, which enabled relevant information to be gathered from the respondents through interviews and academic document analysis. This study used the registration method. The researcher went to the concerned advisers to gather the data needed with the approved letter. This study used the t-test comparing two sample means. Equation created by Mathematics and Statistics Type:

$$t = \frac{\bar{x}_1 - \bar{x}_2}{\sqrt{\left(\frac{(n_1-1)s_1^2+(n_2-1)s_2^2}{(n_1-1)+(n_2-1)}\right)\left(\frac{1}{n_1}+\frac{1}{n_2}\right)}}$$

Where:

x1 = mean of the first group
x2 = mean of the second group
n1 = size of the first group
n2 = size of the second group
s1 = standard deviation of the first group
s2 = standard deviation of the second group.

3. Results

Table 1 above shows the group working twelve (12) learners with their academic performance (grades in the 1st quarter). This indicated in the given table with a mean of 78.75 with a standard deviation of 84.25 and a mean of 79.50 and a standard deviation of 75 for table 2, respectively. For the last table below, table 3, this indicated an observed difference using a t-test of .05 level of significance and degrees of freedom of 22 with the observed level of significance for the *t*-value is -0.68282. The *p*-value is .250923. Therefore, the result of the given study is *not* significant at $p < .05$. There is no significant difference between the performance in mathematics of the working and non-working students of Malacañang High School for the First Grading Period of the School Year 2018-2019. It concludes that even if the student works while studying, he/she can perform in school the same way or better than the non-working students. Teachers indicated that classroom management and preparation time were preconditions for an optimal implementation. Faisal and Annutte (2001) [20], Patrick et al. (2001) [21], in their studies, observed that the decline in the performance of students in mathematics is due to inadequate facilities. Yadar (2007) [21] opines that no course in Science and Mathematics can be considered complete without including some practical work. Lesson study is a kind of classroom inquiry that can facilitate teachers' continuing professional development [24]. In the theory of Gamut [29], he explained that instructional materials which do not fit in the learning levels of the students might be useless in developing skills.

Table 1. Academic Performance of Working Students

GROUP OF WORKING STUDENTS (Treatment 1)					
No.	STUDENTS' NAME/CODE	Grade/Year Level and Section	GRADE IN MATHEMATICS	Diff (X-M)	Sq. Diff (X-M)
1	JM-1	7 - Orchids	78	-0.75	0.56
2	JB-2	7 - Rose	75	-3.75	14.06

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3	RJJr-3	9 – Einstein	79	0.25	0.06
4	GER-4	9 – Einstein	80	1.25	1.56
5	BA-5	10 – Emerald	76	-2.75	7.56
6	RA-6	10 - Emerald	78	-0.75	0.56
7	NM-7	10 – Emerald	78	-0.75	0.56
8	MD-8	10 - Emerald	80	1.25	1.56
9	AM-9	10 - Emerald	78	-0.75	0.56
10	JA-10	10 - Garnet	82	3.25	10.56
11	CM-11	10 - Emerald	85	6.25	39.06
12	MKM-12	10 - Emerald	76	-2.75	7.56
				M: 78.75	***SS: 84.25***

Table 2. Academic Performance of Non-Working Students

GROUP OF NON-WORKING STUDENTS (Treatment 2)					
No.	NAMES	Grade/Year Level and Section	GRADE IN MATHEMATICS	Diff (X-M)	Sq. Diff (X-M)
1	GG-1	7 - Orchids	81	1.5	2.25
2	PMG-2	7 - Rose	79	-0.5	0.25
3	VGRI-3	9 – Einstein	82	2.5	6.25
4	HSS-4	9 – Einstein	78	-1.5	2.25
5	CO-5	10 – Emerald	75	-4.5	20.25
6	MAS-6	10 - Emerald	84	4.5	20.25
7	MTM-7	10 – Emerald	81	1.5	2.25
8	GMD-8	10 - Emerald	75	-4.5	20.25
9	KA-9	10 - Emerald	79	-0.5	0.25
10	AA-10	10 - Emerald	80	0.5	0.25
11	RZL-11	10 - Garnet	80	0.5	0.25
12	DB-12	10 - Emerald	80	0.5	0.25
				M: 79.50	***SS: 75.00***

Table 1 above shows the group working twelve (12) learners with their academic performance (grades in the 1st quarter). This indicated in the given table with a mean of 78.75 with a standard deviation of 84.25 and a mean of 79.50 and a standard deviation of 75 for table 2, respectively. For the last table below, table 3, this indicated an observed difference using a t-test of .05 level of significance and degrees of freedom of 22 with the observed level of significance for the *t*-value is -0.68282. The *p*-value is .250923. Therefore, the result of the given study is *not* significant at $p < .05$. Based on the results and evidence, one can say that whatever the status of educational status, whether regular or part-time students or working and non-working learners, the academic performance in mathematics is the same, meaning there is no significant difference. Liking of the subject mathematics is associated with more positive effects like interest, positive mind, and attitude. Thus, reciprocal relationships exist between every attitudinal measure and mathematics achievement, and the feeling of enjoyment directly affects mathematics achievement (Ma, 1997) [26]

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Table 3. Results from Data Analysis

	Variable 1	*Variable 2*
Mean	78.75	79.5
Variance	7.659090909	6.818181818
Observations	12	12
Hypothesized Mean Difference	0	
Df	22	
t Stat	-0.682823577	
P(T<=t) one-tail	0.25092302	
t Critical one-tail	1.717144374	
P(T<=t) two-tail	0.50184604	
t Critical two-tail	2.073873068	

Table 4. Proposed Strategic Intervention Material Plan for the topic Fundamental Operations on Integers.

PROPOSED STRATEGIC INTERVENTION MATERIAL PLAN	
Introduction Mathematics is a subject that plays vital role in humans' life and to the entire world as well. Many people know its importance but most of them hate it for they can't cope up with even some simple topics related to it. Mathematics is a subject perceived by many as the most difficult subject. But for some this is the most interesting, enjoyable and cool one. The only remedy to learn mathematics is to develop an interest on it, eradicate the concept that it is a hard subject, constant practice and perseverance can be a great help also. This simple Strategic Intervention Material in Grade 7 Mathematics is designed to help Grade 7 Learners to learn a particular difficult topic with ease and enjoyment. This can be called **Subtraction of Integers Made Easy**.	**Topic:** Fundamental Operations on Integers **Subtopic:** Subtraction of Integers **Objectives:** a. State the rule in subtracting integers; b. Subtract integers in 3 different ways: By using a number line By using signed tiles By applying the general rule; and c. Appreciate the use of the three ways of subtracting integers. REFERENCE CARD: **Elementary Algebra, pp. 36-38** Julieta G. Bernabe **Teaching Guide in Grade 7 Mathematics, pp.1-7** Gina Guerra and Flordeliza Francisco, Ph. D. **Our World in Math, pp. 28-31** Ricardo M. Crisostomo Priscila C. de Sagun Alicia L. PaduA

GUIDE CARD	ACTIVITY CARD	ASSESSMENT CARD
Daniel: James, I've learned from the rest of the students here in our campus that		***Direction***: Use the three different ways of subtracting

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you are good in mathematics. May be you're the right person I can turn to.

James: Oh, come on Daniel! They must be kidding you but maybe I could help you. I know a little about math subject. Let's try… What about it?

Daniel: I have a problem. I got the lowest score in our Math Quiz yesterday. It is all about subtraction of integers. I was confused why my answers were wrong while I was very sure that I got them right for I was one of the good students in subtraction when I was in elementary. Can you help me?

I was so ashamed of my performance. I don't want to make it happen again… Please Buddy, help me!

James: Oh sure, no problem! That's very easy. I can still remember what my teacher in Grade 7 Mathematics has taught me. I'll share it with you. I hope I could help you somehow.The first thing you must understand is that, Subtraction is the inverse operation of addition.

You can subtract integers in three different ways.

First: Try to use a number line. Just simply

follow this procedure.

Procedure:

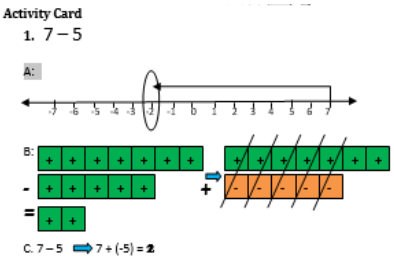
1. Subtracting a positive integer n to m means moving along the real number line a distance of n units to the left from m.

Find first the first addend and then observe the sign of the second addend. If its sign is positive move to the left as

Direction: Find the difference of each of the following items using the three different ways a) using number line, b)using signed tiles and c) using the general rule in subtracting integers.

1. 7 – 5
2. 6 – (-3)
3. (-4) – 8
4. (-5) – (-9)
5. 4 – 10

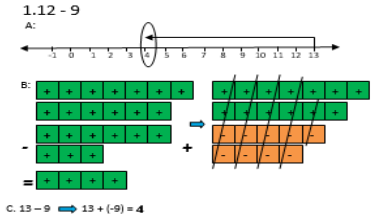
ANSWER:



integers: a) using number line, b) using signed tiles and c) using the general rule in finding the difference of each of the following items.

1. 12- 9
2. 15– (-4)
3. (-4) – (10)
4. (-18) – (-6)
5. 10-6

ANSWER:



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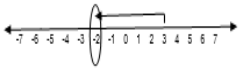
many spaces as the number of the second addend. The number where you stop will be the answer.

Illustrative Example:
Given: n = **3**
m = **5**
(3) - (5) = ____ Answer: **-2**

Solution:

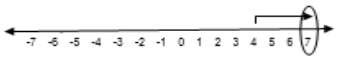


2. Subtracting a negative integer *–n* to m means moving along the real number line a distance of *n* units to the right from *m*.

Find first the first addend and then observe the sign of the second addend. If its sign is negative move to the right as many spaces as the number of the second addend. The number where you stop will be the answer.

Illustrative Example:
Given: n = **4**
m = **-3**

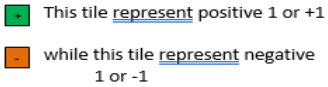
(4) - (-3) = ____ Ans. **+7**



James: Did you get it?

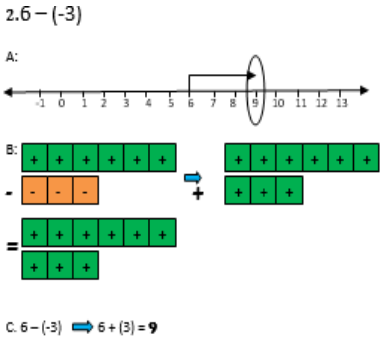
Daniel: Yes Buddy! Thank you… But can you teach me the second method? Subtracting integers by using signed tiles?

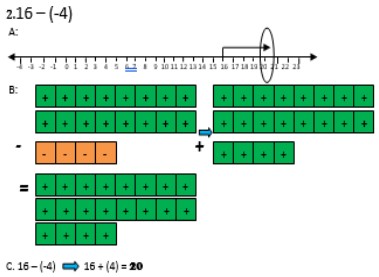
James: Of course, no problem! This is how you do it. First you must familiarize yourself with the two tiles. Here they are:

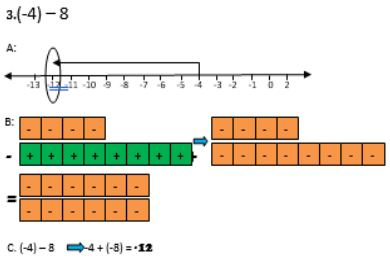


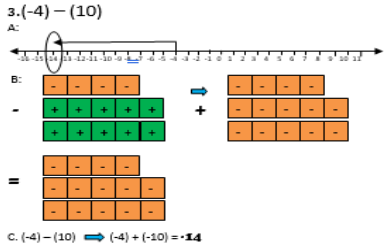
Procedure:

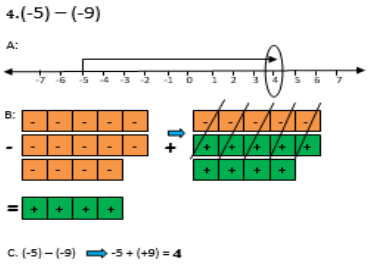
Add the opposite tile of the subtrahend to the minuend. Place first the tiles of

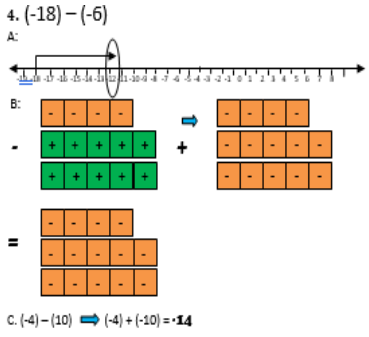












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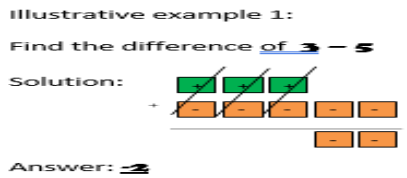
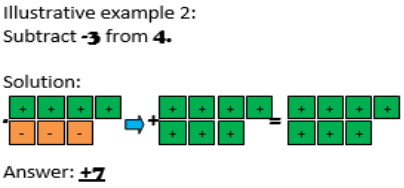
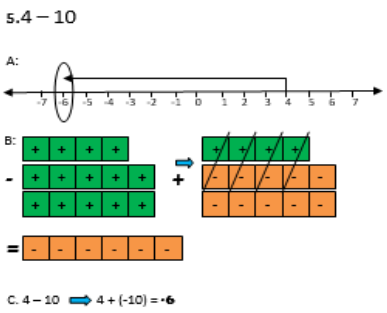
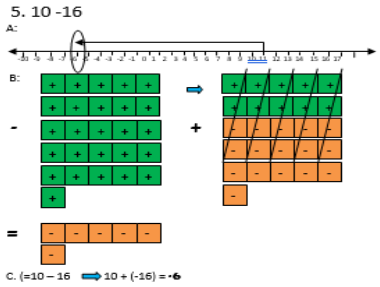
the minuend and then change the operation symbol to addition operation symbol then place the opposite of the original subtrahend. Now perform the addition operation.









James: How do you find it Daniel? Does this method help you find subtraction of integers easier? The third one is by following the general rule in subtracting integers. Just simply relate the two methods you just have learned to make it easier for you to subtract integers?

This is the rule in subtracting integers.

To find the difference between two integers, add the additive inverse of the subtrahend to the minuend.

Here, you are going to mentally change the sign of the subtrahend and then proceed to addition operation.

Illustrative examples:

Find the difference:

1. 3 – 5 ⟶ 3 + (-5) = -2
2. 4 – (-3) ⟶ 4 + 3 = 7
3. (-7) – (2) ⟶ (-7) + (-2) = -9
4. (-6) – (-8) ⟶ (-6) + 8 = 2

Daniel: What a brilliant mind of you? Thank you so much for lending me

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your time and talent… I really appreciate it!
You have helped me a lot in my problem. Tomorrow, I'll be ready and confident enough to take our summative test in math. I believe I'll be able to get a higher score or else a perfect score!

James: If you would love to enhance more your knowledge and skills in subtracting integers, you can try answering the exercises in the Activity and Assessment Cards.

Teacher's initiative in crafting and utilizing instructional materials [26] bridges these gaps towards achieving the educational goals: learning the concepts and mastering the skills. Based on the following assessment results and interviews from the learners, the researchers crafted a Proposed Strategic Intervention Materials (Table 4) for Fundamental Operations on Integers. The SIM was designed as a remediation tool for students in teaching one of the least learned competencies [27]. This will serve as a big help to all laerners in mathematics. Achievement of the students who were exposed to the Strategic Intervention Materials (SIMs) is higher and better compared to the students taught in the traditional approach [28]. The utilization of the SIMs is an effective intervention that made students obtained better scores in the posttest [31].With the school's support and the Department of Education division, the teaching and learning in Mathematics become more resilient, active, and competitive.

4. CONCLUSION AND RECOMMENDATION

From the findings of this paper using the two-tailed test, it is concluded that there is no significant difference between the performance in mathematics of the working and 12 randomly selected non-working students of Malacañang High School for the First Grading Period. The grades show that the working students realized how hard to earn a living; that is why they value every single centavo they have, and every time they are present in the class, they do their best to learn. This attitude leads them to perform in the class the same way as or better than the non-working students who are not bothered by financial constraints. From the conclusion made in this paper, it is therefore suggested that teachers in secondary schools' mathematics will need to design interventions for the working students to achieve higher grades or better performance in mathematics subjects.

For the policymakers, it is suggested that additional policies on the basic education development be made focusing on the provision of programs supporting the welfare and development of the students who belong to the less fortunate families that show great interest in attaining Education. Future researchers suggest that further

investigation on this field be made, including a comparison of achievement of the low performers, average performers, and high performing in mathematics subject.

Teacher's initiative in crafting and utilizing instructional materials [26] bridges these gaps towards achieving the educational goals: learning the concepts and mastering the skills. Based on the following assessment results and interviews from the learners, the researchers crafted a Proposed Strategic Intervention Materials (Table 4) for Fundamental Operations on Integers. The SIM was designed as a remediation tool for students in teaching one of the least learned competencies [27]. This will serve as a big help to all laerners in mathematics. Achievement of the students who were exposed to the Strategic Intervention Materials (SIMs) is higher and better compared to the students taught in the traditional approach [28]. The utilization of the SIMs is an effective intervention that made students obtained better scores in the posttest [31].With the school's support and the Department of Education division, the teaching and learning in Mathematics become more resilient, active, and competitive.

4. CONCLUSION AND RECOMMENDATION

From the findings of this paper using the two-tailed test, it is concluded that there is no significant difference between the performance in mathematics of the working and 12 randomly selected non-working students of Malacañang High School for the First Grading Period. The grades show that the working students realized how hard to earn a living; that is why they value every single centavo they have, and every time they are present in the class, they do their best to learn. This attitude leads them to perform in the class the same way as or better than the non-working students who are not bothered by financial constraints. From the conclusion made in this paper, it is therefore suggested that teachers in secondary schools' mathematics will need to design interventions for the working students to achieve higher grades or better performance in mathematics subjects.

For the policymakers, it is suggested that additional policies on the basic education development be made focusing on the provision of programs supporting the welfare and development of the students who belong to the less fortunate families that show great interest in attaining Education. Future researchers suggest that further investigation on this field be made, including a comparison of achievement of the low performers, average performers, and high performing in mathematics subject.

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