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## Improving the Least Mastered Competencies in Science 9 Using “Pump It Up!” Electronic Strategic Intervention Material

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**Abstract:** The global problem or issue rampant in schools and other educational institutions nowadays is an underachievement. Underachievement is the failure to reach the full potential of learners. The Electronic Strategic Intervention Material or (E-SIM) is the newest remediation material prescribed by the Department of Education to lessen academic underachievement by increasing the learners' performance in the least mastered competencies and skills. This action research aimed to determine the effect of “Pump It Up!” E-SIM in the least mastered competencies in Circulatory and Respiratory Systems Working with Other Organ Systems of selected Grade 9 learners of Manuel Luis Quezon High School. The students were selected using simple random sampling technique (Fishbowl Method). In this sampling technique, twenty students were randomly drawn. In order to collect data, Learners' Pre-Test and Post Test in the least mastered competencies in Circulatory and Respiratory Systems Working with Other Organ Systems were prepared by the teacher-researcher, and Learners' Perception Survey (SPS) developed by Espinosa et. al. (2012) were also utilized. The result showed that the use of the “Pump It Up!” E-SIM has significantly increased the understanding of the lesson in the least mastered competencies in Circulatory and Respiratory Systems Working with Other Organ Systems. It showed a 0.07 normalized gain score which tells the difference between the post-test and pre-test scores. This is confirmed by the paired t-test result of 7.825 with a 95% confidence level and p-value= 0.0000 at 1.729 critical value, hence, there is a significant difference between the pre-test and post-test scores. This E-SIM has a mean score of 3.52, “Strongly Agree” based on the Student Perception Survey. The study reveals that SIM can significantly increase the learners' performance on the least mastered topics. It is recommended that parallel studies be conducted to include E-SIM in regular classroom teaching routines.

**Key Words:** E-SIM; Underachievement; Remediation

### 1. INTRODUCTION

The Department of Education (DepEd) ensures that no student is left behind. Thus, inclusive learning is one of the thrusts of the K to 12 Basic Education Curriculum. This thrust ensures that all learners are given the equal chance to grow at their own pace through varied learning activities. Differentiated instructions and contextualization

allow teachers to provide individual learners the ability to concretize their learning.

In general, Gillies (2008) defined academic underachievement as the perceived failure to reach potentials of learners. Connor (2002) defined underachievement as failure to meet the academic requirements of the school setting. The issue of academic underachievement is one of great concern, especially as it is not just a problem among gifted learners but prevails at all levels of ability. This



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underachievement is often connected with the performance of learners in standardized examinations as it is the most prevalent ways to assess and evaluate. This explains that low academic achievement indicates academic underachievement. Unfortunately, it still afflicts classroom instructions.

The major problem in underachievement in many countries has been identified since 1990. Warrington and Younger, et. al (2005) investigated boys' underachievement in United Kingdom and recognized the legitimate concern of underachievement of some boys in schooling. Lynn Arthur Steen in an article from *Issues in Science and Mathematics* (2003) discussed the growing concern of United States in the stagnation of learners' performance in Mathematics and Science. The report clearly explains this issue of the underachieving curriculum of that time.

The National Achievement Test (NAT) results in our country give a rough estimate of student performance in schools. The low mean percentage scores (MPS) tell us that there are learners who are being tested with low mastery of concepts. In standardized testing, learners tend not to reach their full potential and underperform.

The NAT in Caloocan City showed little progress in Science subject. NAT scores in Science show low performance of learners in Manuel Luis Quezon High School with scores showing "not mastered" with MPS of 38.87 (2012), 44.10 (2014), 39.58 (2015).

The Grade 9 Science First Quarter Examination MPS from SY 2015-2018 also have low performance with scores 51.35, 53.26, 48.60, and 53.09 respectively. This shows the lack of content mastery of the lessons and indicates academic underachievement.

The Department of Education (DepEd) introduced the use of Strategic Intervention Materials (SIM) as a form of remediation to increase the academic achievement of low-performing learners in addressing this problem in schools. DepEd Memorandum No. 117 s. 2005, "Strategic Intervention Materials (SIM) Training Workshop for Successful Learning," paved the way for teachers to develop and use SIM in classrooms. Individual needs are addressed by instructions and interventions.

DepEd also issued Department Order 08 s. 2015 or the Classroom Assessment Policy Guidelines. It states, "There must be sufficient and appropriate instructional interventions to ensure that learners are ready before summative tests," and "There must be

intervention by remediation and extra lessons from that student's subject teacher to a student who receives a grade below 75 in any subject in any quarter." This policy guideline outlines the need to arrest academic underachievement by giving the learners adequate intervention. It also emphasizes inclusive learning. As such, there will be no learners left behind as appropriate instructions and interventions are given to meet individual needs.

### *1.1 Research Questions*

This study was conceptualized to address the need for the development of an E-SIM in Science for Grade 9 learners with least mastered competencies. Moreover, it is also focused on understanding how E-SIM will help improve the learners' mastery of concepts and the perceived effectiveness of the intervention material to the learners. It is also designed to answer the following research questions:

1. What is the level of achievement of learners in terms of the competencies before the use of the "Pump It Up!" E-SIM for least mastered competencies for Unit 1 Circulatory and Respiratory Systems and Working with Other Organ Systems?
2. Is there a significant difference in the students' achievement after using the "Pump It Up!" E-SIM for least mastered competencies for Unit 1 Circulatory and Respiratory Systems and Working with Other Organ Systems?
3. What is the perceived effect of students after using the "Pump It Up!" E-SIM for Unit 1 Circulatory and Respiratory Systems and Working with Other Organ Systems?

## **2. METHODOLOGY**

The first part of the study was the Pre-Test administration. It was given to the students prior to the intervention material. 20 student-respondents were given the 15-item Student's Pre-Test in Circulatory System and the test lasted for 30 minutes.

The E-SIM was given to the student-respondents during the remedial classes after the pre-test. The respondents report for monitoring to the teacher-researcher every day. The students stayed one hour after class to complete the E-SIM. The responses to the E-SIM were checked during the



monitoring to evaluate the progress of the students. Learners who were unable to respond to the E-SIM activities will have to continue reading and studying the same activity until they are able to do so.

The next part was the administration to the students of the Post-Test in Circulatory System as well as the Students Perception Survey (SPS) developed by Espinosa et. al (2012). A focus group discussion was conducted to validate the responses of the students in the SPS and receive feedback on the E-SIM: "Pump it up!".

The last part of the study was data checking, encoding, and analysis.

### 2.1 Research Design

The researchers used descriptive-experimental design. Quasi-experimental one group Pre-Test-Post-Test design was used because one group of students underwent remediation using the E-SIM: "Pump it up!". The pre-test and post-test were taken and compared to determine the effect of the intervention. Descriptive survey was used to determine the students' perceived effect of the E-SIM.

$$O_1 \times O_2$$

Where:

$O_1$  – test before the treatment

$x$  – treatment (E-SIM)

$O_2$  – test after the treatment

The researcher decided to use this design because of the nature of the problem presented. Since the E-SIM is meant as a re-teaching tool (Bunagan, 2016), only selected students who need remediation have been selected. This study used only the data obtained from the experimental group.

### 2.2 Research Respondents

The respondents were selected from a pool of Grade 9 students with low performance scores on a periodic test and failed the quiz on the least mastered topic / competences based on the periodic test. Students were selected using simple random sampling (Fishbowl method).

The name of the pooled students was listed on a sheet of paper and randomly drawn in this sampling technique. Twenty sheets have been drawn to form the respondents.

### 2.3 Research Instruments

The researcher used the following tools and instruments in conducting this study. The "Pump It Up!" E-SIM in Least Mastered Competencies in Circulatory and Respiratory Systems and Working with Other Systems, Students' Pre Test and Post Test in Least Mastered Competencies in Circulatory and Respiratory Systems and Working with Other Systems, and Students Perception Survey (SPS) developed by Espinosa et al (2012).

The "Pump it up!" E-SIM is an intervention material that has already been tested in this study. It was based primarily on the DepEd SIM format. It includes the following essential components: Title Card, Guide Card, Activity Card, Assessment Card and Reference Card

The Student's Pre-Test and Post-Test in Circulatory System is a multiple-choice type consist of 15 items to measure students' level of competency in terms of concept, understanding, and procedure. It was faced and validated by the Master Teacher I and Science Department Head.

The Student's Pre-Test and Post-Test in Circulatory System were tested for reliability using Cronbach's Alpha with a reliability coefficient of 0.62, which falls within acceptable range. The Students' Perception Survey used is based on the SPS developed by Espinosa et. al (2012). It is a 10-item questionnaire which aims to describe the perception of the student on the use of the E-SIM: "Pump It Up!". Each statement is rated using four-choice rating scale, where 1 means strongly disagree, 2 means disagree, 3 means agree, and 4 means strongly agree.

### 2.4 Statistical Treatment

This study used quantitative studies to respond to the declared issues. Several stats were used to evaluate the information acquired.

The Pre-test and Post-test information were evaluated using mean and standard deviation to define the distribution and determine the degree of dispersion of scores. The normalized gain score results were determined to get the difference between the Pre-Test and Post-Test.

In addition, two-tailed paired-sample t-test of means was used to show if there is a significant difference between the pre-test and post-test data. Test analysis is set at 95% confidence level with a degree of freedom of 19. To describe the responses of

the student-respondents in the Students' Perception Survey, mean and standard deviation were also used.

### 3. RESULTS AND DISCUSSION

Based on the gathered data, the researcher found out the following:

#### *Students' Achievement on tests Prior Intervention*

Table 1 shows the frequency distribution of the scores for each item, the mean, and the standard deviation of the students.

Table 1. Pre-Test Results

Item No.	Frequency	Percentage
1	9	0.45
2	4	0.20
3	5	0.25
4	2	0.10
5	3	0.15
6	5	0.25
7	9	0.45
8	4	0.20
9	9	0.45
10	6	0.30
11	5	0.25
12	8	0.40
13	5	0.25
14	5	0.25
15	5	0.10
Mean = 5.40		
Std. Dev. 2.38		
MPS = 36.00		

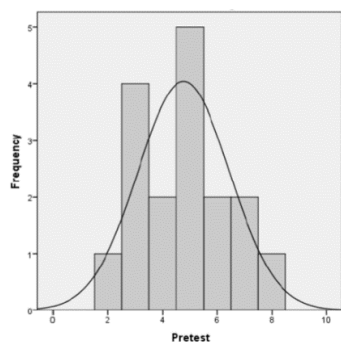


Fig. 1. Frequency Distribution Histogram of Pre-Test Data

A positively skewed distribution tells us that most of the students scored below the mean scores. This indicates that students have lower scores, thus, have low performance on the pre-test.

Based on the data obtained, it can be said that the students showed poor performance on the pre-test. The students' scores are positively skewed and requires intervention to increase the level of achievement.

#### *Students' Achievement on test after the Intervention*

A Post Test was given to the students after the implementation of the intervention material. The scores were tallied and analyzed It showed that the mean of the learners after intervention is 12.0 with a standard deviation of 4.74. Therefore, there is an increase of Post-Test scores compared to the Pre-Test scores. Table 3 shows the frequency distribution of the Post-Test scores for each item, the mean, mean percentage score and the standard deviation of the Post-Test and normalized gain score.

Table 2. Pre-Test and Post-Test Results

Item No.	PRE-TEST		POST-TEST	
	Frequency	Percentage	Frequency	Percentage
1	9	0.45	20	1.00
2	4	0.20	18	0.90
3	5	0.25	20	1.00
4	2	0.10	11	0.55
5	3	0.15	12	0.60
6	5	0.25	6	0.30
7	9	0.45	13	0.65
8	4	0.20	16	0.80
9	9	0.45	7	0.35
10	6	0.30	10	0.50
11	5	0.25	14	0.70
12	8	0.40	7	0.35
13	5	0.25	9	0.45
14	5	0.25	7	0.35
15	5	0.10	10	0.50
Mean		5.40	12.00	
Std. Dev.		2.38	4.74	
MPS		36.00	80.00	
Normalized Gain Score: 0.07				

Espinosa (2012), Togonon (2011), and Dy (2011) support the effectiveness of using SIM for students' mastery of concept. As shown above, the mean scores tell us that the "Pump It Up!" E-SIM helped the student to gain insights about the topic.



*Students' Responses on Students' Perception Survey*

The students' perception about the "Pump It Up!" E-SIM was determined using the Students' Perception Survey patterned from Espinosa et. al. (2012). It contains 10 statements that the students' rated using four-point rating scales. Table 3 summarizes the result of the survey.

Table 3 Students' Perception Survey

Statements	4	3	2	1	Mean	Interpretation
1. The E-SIM helped me understand the lesson on Circulatory and Respiratory Systems and Working with Other Systems	17	3	0	0	3.85	Strongly Agree
2. The presentation of the concepts in the E- SIM is clear and is fitted to my needs.	14	5	4	0	3.65	Strongly Agree
3. I could easily understand the explanations provided by the SIM.	5	15	0	0	3.25	Agree
4. Activities and task given in the E-SIM were very easy.	4	13	3	0	3.05	Agree
5. The time allotment is adequate for each lesson.	20	0	0	0	4.00	Strongly Agree
6. Activities and task given in the SIM were very easy.	3	13	4	0	2.95	Agree
7. I enjoyed reading and doing all the activities provided in the E-SIM.	17	3	0	0	3.85	Strongly Agree
8. E-SIM used words and terms suited to my reading comprehension.	7	11	2	0	3.25	Agree
9. E-SIM inspired and encouraged me to learn more topics in Science.	15	4	1	0	3.70	Strongly Agree
10. I want to use SIM in a regular classroom teaching next time.	13	6	1	0	3.60	Strongly Agree

#### 4. CONCLUSIONS

The researcher, based on the data presented, concludes the following:

1. The students, before intervention, showed poor performance in Circulatory and Respiratory Systems and Working with Other Organ Systems. Students have poor conceptual knowledge, comprehension, and procedural knowledge in flow of blood in the heart. The students' frequency distribution is positively skewed.
2. The students showed significant increase in post-test scores based on the 0.70 normalized gain score and the result of analysis of the means of the Pre-Test and Post-Test.

3. "Pump It Up!" E-SIM is challenging for the students but the students enjoyed the use of the learning material. Students' responses suggest that E-SIM should be used more often.

#### RECOMMENDATIONS

Based on the findings of the study and the conclusion, the following are recommended:

1. Conduct further research on the use of E-SIM in other subjects to validate the impact of E-SIM in educational results.
2. Conduct research on the inclusion of E-SIM in periodic school learning to determine the applicability of E-SIM as a school training instrument.



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3. Conduct research on the applicability and acceptability of E-SIM for all learners and all other subjects/disciplines.

Department Order no. 08 s 2015. Policy Guidelines on Classroom Assessment.

DepEd Memorandum no. 117 s 2005. Training-Workshop on Strategic Intervention Materials for Successful Learning.

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