



CONTENT-BASED STORY ANIMATION AND DIGITAL STORYBOOK: THEIR EFFECTS ON STUDENTS' COMPETENCE IN EXPLAINING HOW THE DIFFERENT ORGAN SYSTEMS WORK TOGETHER

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CONTENT-BASED STORY ANIMATION AND DIGITAL STORYBOOK: THEIR EFFECTS
ON STUDENTS' COMPETENCE IN EXPLAINING HOW THE DIFFERENT
ORGAN SYSTEMS WORK TOGETHER

A Completed Research



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Abstract

The aim of this study is to test the effectiveness of Content-Based Story Animation and Content-Based Storybook on students' competence in explaining how the different organ systems work together. True experimental research design (three-group pretest-posttest) was used to test which method/s of instruction is the most effective in teaching Science and qualitative research design (open-ended questions) to know the advantages and disadvantages of the interventions employed. Three groups of students, 15 each, were pre-tested and post-tested, the ultimate difference is that two groups (experimental groups) were exposed to the use of content-based story animation and content-based digital storybook as supplemental tools to their Self-Learning Modules and Online Distance Learning Modality while the control group was exposed only to the use of Self-Learning Modules and slide decks during virtual classes. Using One-Way Analysis of Variance (ANOVA), the computed value for posttest is less than 0.05 which implies that there is a significant difference in the posttest scores of the control group and experimental groups. Meanwhile, the test for significant increase using paired sample t-test and the pos-hoc analysis through Tukey's Multiple Comparison Test revealed that both content-based tools are more effective than the use of only SLMs and slide decks however, the content-based digital storybook is the most effective method of instruction. Moreover, based on the students' responses, the features of the materials emerged to have immense contribution to the increase in the performance of the learners while some of its disadvantages hindered the learners in achieving much higher performance.

Keywords: Content-Based, Animation, Digital Storybook



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I. Context and Rationale

The swift advancement of Science and Technology stances a significant challenge to the Philippine Education System to be at par with the fast-changing society. Keeping up to this advancement lies primarily on the quality of education provided to every Filipino learner. But this is not just about acquiring advance facilities and technologies but also looking directly into the needs of the learners and providing necessary intervention to meet the demand of equipping learners with necessary skills and competence which will prepare them to take on the challenges of the 21st century. This is one of the provisions of the K to 12 Basic Education Program as stated in DepEd Order No. 021, s. 2019. Furthermore, producing highly competitive and scientifically inclined learners up to international standards will help him/her compete on the global context.

In its latest participation in Trends in International Mathematics and Science Study (TIMSS) in 2003, Philippines ranked 43rd out of 46 countries in HS II Science while it placed 23rd out of 25 participating countries in both grade 4 Math and Science (The Manila Times, 2014). Moreover, in its first-time participation to the Programme for International Student Assessment (PISA), Philippines ranked second to the last in math and science among 79 countries.

Such survey and test reflect a slow performance demonstrated by Filipino learners which is also very patent in the result of 2018 National Achievement Test of Region 2. Science has the lowest rank among all 5 subjects tested in grade 6 with a Mean Percentage Score (MPS) of 28.42, and in the



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Division of Tuguegarao City, Science has a MPS of 31.02, an affirmation that there really lies a problem. Moreover, the results of the past three consecutive school year periodical examination of the Grades 3 to 6 learners of Tuguegarao East Central School show that Science is one of the two subjects with the lowest percentage of achievement at 56.23%, 67.54% and 69.12% respectively.

In Elementary Science, there are topics that are taught theoretically since practical laboratory is not possible hence, requires deeper understanding and comprehension. Science may sometimes be difficult for learners to comprehend when they are not able to see the phenomenon or experience it in real life such as concepts on the human organ system, geological phenomena, places like outer space, or animals living in extreme climates such as penguins and polar bears (SCHOOLBAG The Education News Site, 2016). This suggests a need to expose learners in alternative situations where they can relate themselves. This agrees with the concept that learning must be designed in such a way that students can carry out activities and solve problems that are characteristic of such tasks in real situations in daily life (SEAMEO INNOTECH, 2018).

One way to relate Science concepts with real life situation is to contextualize/localize the materials through short stories. Short stories with authentic texts would let learners understand how Science concepts work in relation to real life situations and according to Canvas Network, when designing contextualized instruction, the role of a teacher is to create effective and engaging learning experiences that will (a) help learners tackle the real-world



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problems or tasks they will encounter as they pursue their future aspirations, and
(b) draw on their life experiences to make the learning experience relevant and engaging.

II. Innovation, Intervention, and Strategy

To better address the different learning needs/style or diversities of the learners, the proponent utilized the content-based stories in the forms of story animation and digital storybook in teaching Science to enhance pupils' academic performance. Along with this premise, this study is conceptualized.

Content-Based Story Animation and Content-Based Digital Storybook are enhanced way of delivering short stories to learners. These instructional materials could help teachers in achieving the four competencies indicated in the Result-based Performance Management System (RPMS) tools: Applies knowledge of content within and across curriculum teaching areas, uses a range of teaching strategies that enhance learner achievement in literacy and numeracy skills, uses differentiated, developmentally appropriate learning experiences to address learners' gender, needs, strengths, interests and experiences, and selects, develops, organizes, and uses appropriate teaching and learning resources, including ICT, to address learning goals (Department of Education - Bureau of Human Resource and Organizational Development, 2018).



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The story used in animation and storybook was originally written by the proponent. The animation was the output of Region 02 (together with other two members) during their participation in the Development and Finalization of Multimedia Learning Resources conducted by the Department of Education-Bureau of Learning Resources. Same output was submitted to DepEd-BLR as exclusive owner of the Work and of the copyright of the Work as agreed upon in the Writer's Assignment Agreement.

Content-Based Digital Storybook

Content-Based Storybook is one of the intervention materials in the implementation of research. It is a story divided into 4 series packaged as storybook (text with illustrations). Each series has 6-7 pages. Every series has a 10-item comprehension check questions. This reading material focuses on Science concepts which was used as a springboard at a one series per day scheme, at their most convenient time of the day, for four days prior to the virtual class discussion. In the process, they learn and understand Science through reading selections.

Stories with illustrations is important in order to help children take meaning from text as well as develop aesthetic understanding. Moreover, providing information through pictures is an important and fast developing method of communication in the global world (TeachingEnglish Article: Story books in the classroom, 2019).

Material is available at <http://bit.ly/DigitalStorybookMKSM2021>



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Content-Based Story Animation

Content-Based Story Animation is the animated version of the Content-Based Storybook. It is also composed of 4 episodes packaged with audio and moving illustrations. It also has a 10-item follow-up questions. These were given to learners as a springboard, also, at a one episode per day scheme for four days at their most convenient time, prior to the virtual class discussion.

First purpose of animation in academic is to fulfill a cognitive function. Animations are intended to support students' cognitive processes that ultimately result in them understanding the subject matter. Secondly, as an affective learning tool that attracts attention, engages the learner and sustains motivation aspect (Desai, 2018).

Material is available at <http://bit.ly/StoryAnimationMKSM2021>

III. Action Research Questions

This study aimed to test the effectiveness of Content-Based Story Animation and Content-Based Storybook in increasing pupils' understanding of Science concepts, thus attain growth in their academic performance.

More specifically, this study attempted to provide answers to the following questions:

1. What is the Mean Performance of the pupils under the control group and experimental groups before and after the implementation of the interventions?
2. Are the three groups of students significantly homogenous?



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3. Is there a significant difference in the Pretest Mean Performance and Posttest Mean Performance of the three groups of students?
4. Is there a significant increase from the Pretest to the Posttest Mean Performance of the students in each of the three groups of students?
5. What is the most effective method/s of instruction?
6. As perceived by the students, what are the advantages and disadvantages of the interventions employed?

IV. Action Research Methods

a. Participants and/or other Sources of Data and Information

The teacher-proponent handled three regular heterogenous group of pupils in Science 6 at Tuguegarao East Central School – Infra, Delta and Gamma, for the School Year 2020-2021. Pupils under these sections underwent diagnostic test at the beginning of the school year. The result was used to validate if same competency is consistent as the lowest until the present school year. Fishbowl technique was employed to identify which class or section were to be exposed to the different teaching methods. Based on the sampling done, section Infra was drawn as the control group, section Gamma as the first experimental group, and delta as the second experimental group. The number of participants in each group was based on the group with least number of learners with gadget. Meanwhile, to identify the participants in the groups with excess number of learners with gadgets, again, simple



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random sampling was used. Participants from the class with excess number of learners with gadgets were chosen via fishbowl technique.

b. Data Gathering Methods

This study used true experimental research design (three-group pretest posttest) to test which method/s of instruction is most effective in teaching Science and qualitative research design (open-ended questions) to know the advantages and disadvantages of the interventions employed.

Each group was pre-tested and post-tested, the ultimate difference is that the two experimental groups, section Gamma was exposed to the use of content-based story animation and section delta was exposed content-based digital storybook, as supplemental tool to their Self-Learning Modules for Modular Distance Learning Modality and slide decks for Online Distance Learning Modality while the control group, section Infra, was exposed only to the use of Self-Learning Modules and slide decks/lesson cards. In addition, the proponent also provided a short questionnaire to the participants to solicit responses on the advantages and disadvantages of the interventions employed.

The intervention tools were sent via learner's Facebook Messenger respective Group Chat at a one episode/series per day scheme. Alongside with the animation video and digital storybook are follow-up questions about the story. The proponent supervised the pretest and posttest and survey



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questionnaire online in real time via Google Suite/Microsoft 365 software to ensure reliability.

c. Ethical Issues

The researcher properly cited authors' materials that formed part in this study. Likewise, the illustrator, animator and voice artists of the instructional materials were also be credited.

The animation conforms with the ethics of non-maleficence wherein the screen time per episode does not cause harm to the health of the learners.

A letter requesting for the approval of the research proposal endorsed by the school research committee was sent to the principal's office. This was to quality assure and evaluate the proposal before its implementation.

Policies and guidelines of BERF were followed in the conduct of the research.

Moreover, the approval for its implementation assured that no one was coerced into participating the study, hence letter of consent was requested to the parents of the participants of this study.



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V. Discussion of Results and Reflection

This study used the true experimental research design. The 5% level of significance was used as reference level in all analyses. Statistical Product and Services Solutions (SPSS) Version 23 was used to analyze the data.

Mean Performance of the Three Groups of Students

The mean performance of the three groups of pupil-respondents is presented and discussed below using mean and standard deviation.

Table 1. Mean Performance of the Control Group and Experimental Groups

Groups	Pretest		Posttest	
	Mean	Standard Deviation	Mean	Standard Deviation
Control	9.27	3.17	11.13	2.56
Experimental 1	9.33	2.99	15.73	2.40
Experimental 2	9.27	3.15	16.00	2.65

Shown in table 1 is the mean performance of the control group and experimental groups before and after the implementation of the interventions.

The table reveals that the control group which was exposed only to the use of slide decks presented via virtual class and SLM has a pretest mean score of 9.27 with a standard deviation of 3.173 and a posttest mean score of 11.13 with standard deviation of 2.56. Meanwhile, the first experimental group exposed to slide decks presented via virtual class, SLM and content-based story animation got a pretest mean score of 9.33 with a standard deviation of 2.99 and





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a posttest mean score of 15.73 with a standard deviation of 2.40. The table also uncovers that the second experimental group which was also exposed to slide decks presented via virtual class, SLM and content-based digital storybook got a pretest mean score of 9.27 with a standard deviation of 3.15 and a posttest mean score of 16.00 with a standard deviation of 2.65. This means that there was an improvement on the performance of the three groups of students along different method of instruction.

The data indicate that the three methods of instruction are effective in teaching how the different organ systems work together.

Homogeneity of the Three Groups of Students

The test to know the equality of competency level of the three groups of pupil-respondents is presented and discussed in table 2 using the result of the Levene's Test of Homogeneity.

Table 2. Homogeneity of the Control Group and Experimental Groups

	Levene Statistic	df1	df2	Sig.	Interpretation
Pretest	.185	2	42	.832	not significant
Posttest	.303	2	42	.740	not significant

Gleaned from the table is the homogeneity of the control group and experimental groups before and after the exposure of the pupil-respondents on the three methods of instruction.





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In the pretest, since the sig. value of .832 is greater than 0.05, the interpretation marked not significant. Meanwhile, the posttest sig. value is .740 and is also greater than 0.05 which is interpreted as not significant. The interpretation “not significant” means no disparity hence variances across the three groups are equal.

The data imply that the three groups of learners are homogeneous or have equal competency level before and after their exposure to the different methods of instruction.

Comparison of the Pretest Mean Performance and Posttest Mean Performance of the Three Groups of Students

The test for the significant difference in the Pretest Mean Performance and Posttest Mean Performance of the three groups of students is presented and discussed below based on the result of the One-way Analysis of Variance (ANOVA) test.

Table 3. Comparison of Pretest and Posttest Mean Performance of the Control Group and Experimental Groups

		Sum of Squares	df	Mean Square	F	Sig	Interpretation
Pretest	Between Groups	.044	2	.022	.002	.998	not significant
	Within Groups	405.20	42	9.65			
Posttest	Between Groups	224.58	2	112.29	17.42	.000	significant
	Within Groups	270.67	42	6.44			





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The table illustrates the comparison of the pretest and posttest mean performance of the control group and experimental groups.

As seen on the table, the computed sig. value for the pretest of the three groups of learners is .998 which is greater than 0.05 level of significance thus, marked as not significant whereas the computed sig. value of the posttest of the three groups of learners is 0.00, less than 0.05 level of significance, with an interpretation of significant. This means that the pretest mean performance of the learners does not connote any significant difference since they were not yet exposed to any of the three methods of instruction. Meanwhile, the posttest suggests a significant difference in their posttest result since the pupil-respondents were already exposed to the different methods of instruction.

This then implies that one or two of the method/s of instruction is/are more effective tool in explaining how the different organ systems work together.

Significant Increase on the Pretest and Posttest Results of Each of the Three Group of Students

The test on the significant increase from the mean performance to the mean performance of the pupil-respondents in each of the three groups is presented and discussed using the result of the treatment done through Paired Samples T-Test.



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Table 4. Comparison of Pretest and Posttest Mean Score of Each Group

Group	Paired Difference		t	df	Sig. (2-tailed)	Interpretation
	Mean	Standard Deviation				
Control	-1.87	1.81	-4.000	14	.001	significant
Experimental 1	-6.40	1.88	-13.169	14	.000	significant
Experimental 2	-6.73	1.10	-23.712	14	.000	significant

Exhibited in table 4 is the comparison of the pretest mean score and posttest mean score of the pupil-respondents in each of the three groups as to extent of increase.

It shows that the control group has a -1.87 difference from the pretest to the posttest with a sig. value of 0.001. The first experimental group also garnered a -6.40 pretest and posttest mean difference with a sig. value of 0.000 while the second experimental group got a -6.73 with a sig. value of 0.000. All groups have a sig. value less than 0.05 level of significance hence brings a result of having a significant difference from the pretest to posttest mean performance of each group of pupil-respondents.

This implies that the different methods of instruction are all effective in improving the competency of students in explaining how the different organ systems work together. This is possible since learning took place in the different methods of instruction. However, the discrepancy in the paired difference





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indicates that one group emerge to have the greatest difference or most noticeable change in their pretest and posttest mean performance – the group that was exposed to the use of content-based digital storybook. Therefore, the use of this tool is the most effective method of instruction. This finding is further validated by table 5 discussion.

Most Effective Method of Instruction

Pos-hoc analysis through Tukey's Multiple Comparison Test investigated the result of the Analysis of Variance (ANOVA) wherein the posttest mean performance of the three groups are found to be significant. The analysis identified which of the paired posttest means made the significant difference or where did the difference come from. This is presented on the table below.

Table 5. Pos-hoc Analysis of the Most Effective Method of Instruction

	Mean Difference	Sig.	Interpretation
Pair A (Online Slide Decks/Lesson Card x Content-Based Story Animation)	-4.600*	.000	Significant
Pair B Online Slide Presentation x Content-Based Digital Storybook	-4.867*	.000	Significant
Pair C Content-Based Story Animation x Content-Based Digital Storybook	-0.267	.955	not significant





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Manifested in table 5 is the result of pos-hoc analysis of the posttest results of the three groups of learners.

As to the posttest mean difference of pair A which is -4.600, it got a sig. value of 0.000 while the posttest mean difference of pair B is -4.867 with a sig. value of 0.000. Pair C has a posttest mean difference of -0.267 with a sig. value of .955. Both pair A and pair B has a sig. value less than 0.05 level of significance hence both pairs have a significant difference in their posttest means. Meanwhile, since pair C sig. value is more than 0.05 level of significance, there is no significant difference in the posttest mean scores of this pair. The gap between the posttest mean scores of each group comprising each pair with significant difference is an evident that one group in each paired group was exposed to a more effective method of instruction and that in these pairs emanated the difference. The significant value of the posttest means of pair C was the deciding factor to safely say that the groups exposed to content-based stories via animation and digital storybook perform better than those who were only exposed to online slide decks or slide decks presented via online/virtual class.

This then suggests that the use of content-based stories through animation and digital storybooks are both effective methods of instruction than the usual use of SLMs and Online Distance Learning. Merging the result of this analysis with the analysis in table 4 and on the comparison of the mean difference of the three pairs, between the two content-based interventions, content-based digital storybook is the most effective method of instruction.



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Advantages and Disadvantages of the Intervention Tools employed for Each Method of Instruction

Thematic analysis of students' responses was used to present and discuss the advantages and disadvantages of the different intervention tools used.

Table 6. Student responses on the advantages and disadvantages of the different methods/tools employed

Method/Tool	Advantages	Disadvantages
Control Group (Slides Decks/Lesson Cards Used/ Presented during the Online/Virtual Class)	<ul style="list-style-type: none"> • Normal reading material in school • I learned about organ systems • Ang ipinakita sa amin ay nakakadagdag ito sa aking kaalaman (What was shown to us gave me additional knowledge) • It was understandable • Summarizes the lesson 	<ul style="list-style-type: none"> • The picture of inside the body is disgusting • The screenshots of the materials appeared to be self-taught and I would like to have more
Experimental Group 1 (Content-Based Story Animation)	<ul style="list-style-type: none"> • Interesting, entertaining, encouraging, and fun • Gives information and knowledge. • It helps me understands how the body works • Explains the lesson well • It encourages me to do my activities. • Animation is beautiful • I like the organization of the animation 	<ul style="list-style-type: none"> • Very short time per episode • Walang nakasulat sa baba, mahirap intindihin agad kasi English (No subtitle, English is very hard to understand)
Experimental Group 2 (Content-Based Digital Storybook)	<ul style="list-style-type: none"> • Makes me understand the lesson well • Fun to read • Very informative • Question is tricky but add knowledge about organ systems 	<ul style="list-style-type: none"> • There is one character that I had hard time to figure out – <i>Mang Andoy</i> as the Pituitary Gland





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	<ul style="list-style-type: none">• Very detailed• The pictures in the storybook are colorful.• It is more understandable, and our imagination works while reading.• The story is good. I am satisfied.	<ul style="list-style-type: none">• Sentences are long
--	--	--

Shown in the table is the student responses as to the advantages or what are the things that they like about the tools given to them and the disadvantages or the things that they don't like about the tools they are exposed to.

Advantages of the Different Intervention Materials Used

Analysis from the responses on the advantages of the tools used in each teaching method came up with 3 themes.

1. Creative and Enjoyable

Participants exposed to both content-based story animation and content-based digital storybook emphasized in their statements how they enjoyed the materials/tools given to them.

On online slide decks, John sees the materials as “*normal reading material in school*” which means as if the material brought him to the usual face-to-face learning.

On story animation, Andrew said, “*Very interesting and at the same time it is entertaining.*”



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On digital storybook, Shane shared, *“It’s really fun to read and helps me understand the lesson.”*

Meanwhile, other participants appreciated how the stories were delivered through animation and digital storybook and encouraged them to learn.

“The animation is beautiful.”

One added, *“It encourages me to do my activities.”*

“The pictures in the storybook are colorful.”

One participant supplemented this by saying that her imagination works while reading.

2. Informative and Explanatory

Almost all the participants reported that the tools gave them idea/information about the topic and helped them understand the lesson.

On online slide decks, Aaron stated, *“Ang ipinakita sa amin ay nakakadagdag ito sa aking kaalaman* (What was shown to us gave me additional knowledge).”

On story animation, Ron asserted, *“It is very informative.”*

On digital storybook, Hanna stated, *“Question is tricky but add knowledge about organ systems.”* She emphasized how the comprehension questions led her how to understand the lesson.

Other participants explicitly highlighted how the materials helped them become independent learners since the materials are already explanatory.



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“It was understandable.” The slide decks’ bulleted and short statements are direct to the point made easy for this pupil to understand the lesson even if the teacher does not have to explain.

“Explains the lesson well.” This statement of one of the pupil-respondents exposed to story animation sees the story helpful in explaining the lesson.

“It helps me understands how the body works.” This answer did not just talk about the organ system but specifically how the body works with the teamwork of the different organ systems as contextualized through a story in the digital storybook.

3. Organized and Detailed

The third theme talked about the organization of the contents of the tools. On the account of some respondents, they highlighted the continuity of each deck content/episode/series until the big idea/concept is formed.

On online slide decks: *“Summarizes the lesson.”* – Dane

On story animation: *“I like the organization of the animation.”* – Isa

On digital storybook: *“The material is detailed.”* – Ina

The responses of the pupil-participants encapsulated the features of a good learning material particularly on how it was related to real life situation for better understanding, how the illustrations and animation was comprehensively packaged to arouse learners’ interests and how the storyboard and script was carefully written to help learners realized what should be learned. However,



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based on the statements of the pupil-respondents, the degree of how the tools/materials helped them increase their competence on the topic differ.

This means that depending on the interest of the learners or if the learning style were considered in the preparation of the materials, it would greatly help them understand the lesson. Among the three materials two of which, the story animation and digital storybook, have accounts that the animation and the pictures were encouraging and activated one's imagination. This supports the statement: for the students to learn effectively and efficiently, acquisition and integration of information must be based on their learning styles (SEAMEO INNOTECH, 2018). Moreover, it is also noteworthy to emphasize how the level of understanding vary among each respondent from each group based on the intervention given to them. From "It was understandable" to "it was explained well" to "I understand how the body works." This third statement by a pupil-respondent exposed to story animation is the big picture. It is the concluding statement that would tell if the learners achieved the required competency.

This implies that the features of the content-based story animation and content-based digital storybook emerged to have played a vital role and have immense contribution and effect to the increase in the performance of the learners after these were used as intervention materials/supplemental tools.



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Disadvantages of the Different Intervention Materials Used

On the analysis of responses on the disadvantages of the tools used in each method of instruction, two themes surfaced: comprehension level and technical specifications. Almost half of the pupil-respondents answered nothing or none.

1. Comprehension Level

The comprehension level of the pupil-respondents is very much critical in the success of the implementation of the different intervention tools. This became one of the disadvantages accounted from the statements of some pupil-respondents.

For online slide decks, Darwin stated, *“The screenshots of the materials appeared to be self-taught, and I would like to have more.”*

For story animation, Anton detailed, *“Walang nakasulat sa baba, mahirap intindihin agad kasi English (No subtitle, English is very hard to understand).”*

For digital storybook, Ina answered, *“Sentences are long.”*

2. Technical specifications

This theme emanates from the responses of visually inclined pupil-respondents. Consolidated responses are the following:

For online slide decks, Andrew said, *“The picture of inside the body is disgusting.”* The picture referred to in statement is the downloaded creative common image of the different organs of the body.

For story animation, Anton reported, *“Very short time for every episode.”* Every episode runs for only 2-3 minutes.



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For digital storybook, Zia answered, “*There is one character that I had hard time to figure out – Mang Andoy as the Pituitary Gland.*” Some learners are not familiar yet with how a pituitary gland looks like.

The recorded responses on disadvantages of the different intervention materials/tools would help in the improvement of the tools/materials. However, these advantages should not be ignored especially that they might have been contributory factors to low comprehension level. The “lack of subtitle” and the “very long sentences” may have given learners difficulties in understanding the lesson. It is important to note that there are some learners who are more into visual/spatial rather than on aural (auditory). This might have also influenced their perceptions on the disadvantages of the different learning materials. Moreover, there are also learners who are more into aural rather than on visual or spatial that is why their exposure to good images/illustrations and animations is very crucial for their comprehension. This is supported by the result of a study that while there are many factors involved in reading comprehension, being aware of students’ learning styles and adapting lessons to include activities in all learning styles may be beneficial to help students in reading (Williams, 2010).

This discussion suggests that when it comes to the disadvantages of each of the material/tool, the degree of the negative effects of the responses are equal across all intervention materials/tools used. The need for more material is as essential as the need for subtitles and shorter sentences. Also,



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the “disgusting” picture might have prevented the learners to study the content of the slide and the too short exposure to the animation and the use of unfamiliar drawing might have contributed to some misconceptions and low comprehension among the pupil-respondents. These disadvantages might have hindered the learners in achieving a much higher performance, thus need to be taken care of.

Based on the results and findings, the following reflections were made:

1. Content-based intervention materials/tools presented through story animation and digital storybooks can improve the competence of the students in explaining how the different organ systems work together.
2. The use of content-based intervention tools as supplemental materials is better than the use of SLMs and slide decks presented through online/virtual class only.
3. Among the three methods of instruction, the use of digital storybook as supplemental tool/material is the most effective method of instruction.
4. Identified features of the content-based story animation and content-based digital storybook such as the capability of the materials/tools to cater the different learning styles of the learners and to promote effective problem-solving skill since the materials are contextualized,



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emerged to have played a vital role and have immense contribution and effect to the increase in the performance of the learners after these were used as intervention materials. The use of animation and storybook is highly recommended as strategy not just in Science 6 but also in other learning areas and across all grade level.

5. The recorded disadvantages would help in the improvement of the tools and would serve as a basis/baseline data for a follow-up study that would focus on validating some factors that could affect the implementation of the different teaching methods used in this study.



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VI. Action Plan

The results and findings will be continuously disseminated so that the kind of intervention tools or strategies used will be sustained, utilized and put into practice to improve the quality of teaching-learning in all grade level and learning area and across different learning modalities.

The proponent will communicate the features of the intervention materials/tools, how it should be used in either face-to-face or distance learning modality, and its effectiveness in improving learner's competence in Science 6, specifically in explaining how the different organ system work together, to the school heads and teachers in the division through Learning Activity Cell Sessions and/or In-Service Trainings. To ensure utilization of the result for teachers not teaching Science 6, they will be required to submit an output: story animation or storybook (draft or finalized) of the least mastered competency in the subject and grade level they are teaching.

Dissemination of results and findings will also be done in the regional level through attendance and participation in Basic Education Research Conferences

The proponent also plans to submit an IMRAD copy of the completed action research so that it will be included in the division research journal – *passinamuan*.



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VIII. Financial Statement

ACTIVITIES	ITEM DESCRIPTION/ PARTICULARS	RESOURCES		
		Quantity	Unit Cost	Total Amount
<ul style="list-style-type: none"> Manuscript Writing and Intervention Materials Preparation/Finalization Research Finalization and Approval 	Bond paper (A4)	1	₱175.00	₱175.00
	Ink (CMYK)	1	₱960.00	₱960.00
	Folder	3	₱12.00	₱36.00
	Binding	5	₱150.00	₱750.00
<ul style="list-style-type: none"> Data Gathering (Administration of pretest, employment of intervention, administration of posttest and floating of survey questionnaire, Research Analysis, completion, and submission 				
<ul style="list-style-type: none"> Research presentation/ dissemination (3 days) 	Load Allowance	1	₱300.00	₱300.00
TOTAL				₱2,221.00



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TABLE OF SPECIFICATIONS
 Science 6 Pretest

Competency: Explain how the different organ systems work together (S6LT-Ilc-d-2)

Item Placement	Remember	Understand	Apply	Analyze	Evaluate	Create
1	√					
2	√					
3				√		
4		√				
5	√					
6			√			
7		√				
8				√		
9	√					
10				√		
11	√					
12			√			
13			√			
14	√					
15		√				
16					√	
17						√
18	√					
19		√				
20		√				
Total	7	5	3	3	1	1

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PRETEST
SCIENCE 6

Directions. Read each item carefully and choose the best answer.

1. Which of the following organ system enables the body to take in oxygen and give off carbon dioxide and moisture?
 - a. Nervous System
 - b. Digestive System
 - c. Circulatory System
 - d. Respiratory System
2. What organ system of the body works with the urinary system to filter wastes and extra water from blood?
 - a. Nervous System
 - b. Digestive System
 - c. Circulatory System
 - d. Respiratory System
3. Which is the correct arrangement of how hormones are delivered to the different parts of the body?

- I. Glands of the endocrine system produce hormones.
- II. The circulatory system through the blood delivers these hormones to the different parts of the body.
- III. Nervous system signals the endocrine system to produce hormones.
- IV. Hormones are released to the bloodstream to the different parts of the body.

- a. I, II, III, IV
 - b. II, IV, I, III
 - c. III, I, IV, II
 - d. IV, III, II, I
4. Nutrients are broken down from the food that we eat through the digestive system. These nutrients are then delivered to the different parts of the body through the circulatory system. Where do these nutrients pass through to reach the blood stream?
 - a. Alveoli
 - b. Nephrons
 - c. Neurons
 - d. Villi



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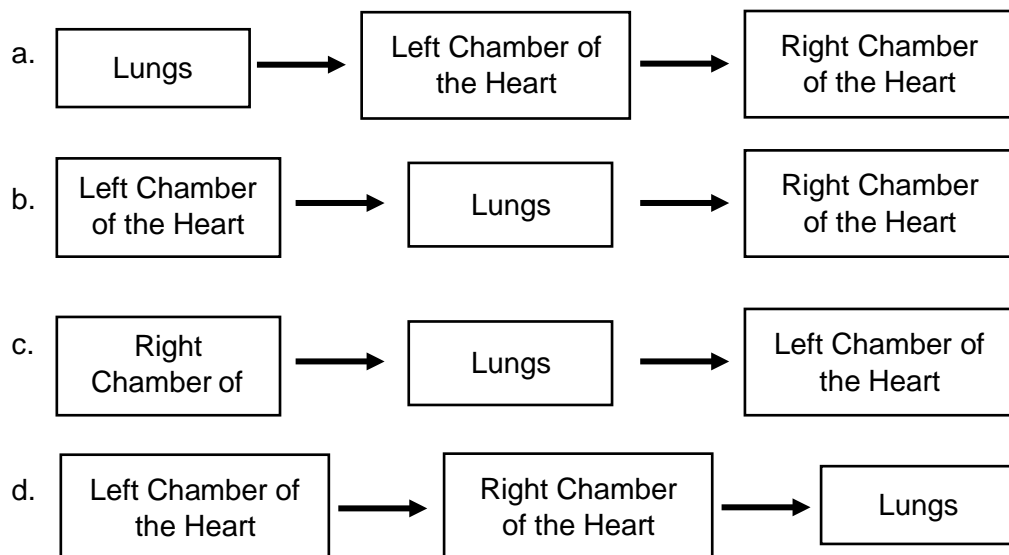
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5. Which of the following system controls and regulates the function of other systems of the body?
- Urinary System
 - Nervous System
 - Endocrine System
 - Respiratory System
6. Which of the following diagram shows the correct process of how exchange of gases occurs during pulmonary circulation?



7. Which statement DOES NOT support the idea that systems work together as a unit to make sure that the body keeps functioning?
- Digestive system breaks down and dissolves food for the use of the different parts of the body.
 - Circulatory system delivers all the necessary materials to and from the different parts of the body.
 - Urinary system filters and excretes its own waste from the body and produces nutrients for its function.
 - Endocrine system produces hormones which carries information on what action every part of the body will do.



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8. Oxygen is the body's fuel hence is necessary for its function. Which may hinder the delivery of oxygen to the different parts of the body?

- I. When the heart stops beating.
- II. When the kidneys stop filtering.
- III. When the brain stops functioning.
- IV. When the adrenals stop producing adrenaline.

- a. I and II
- b. III and IV
- c. I, II and III
- d. I, III and IV

9. Where does the circulatory system collect the materials needed by the body to function?

- a. Glands, lungs, and brain
- b. Small intestine, glands, and lungs
- c. Brain, small intestines, and glands
- d. Kidneys, small intestine, and lungs

10. Which pairing DOES NOT belong to the group?

- a. Kidneys and bile
- b. Lungs and oxygen
- c. Glands and hormones
- d. Small Intestine and nutrients

11. What system of the body receives carbon dioxide from the blood for release?

- a. Urinary System
- b. Nervous System
- c. Digestive System
- d. Respiratory System

12. Roy's kidneys failed to function. Which of his organ system will not be served properly and why?

- a. endocrine system because hormones will not be formed completely.
- b. digestive system because urine will not be able to collect the nutrients from it.
- c. respiratory system because no enough oxygen will pass the lungs to the blood.
- d. circulatory system because blood will be filled-up with excess water and waste materials.



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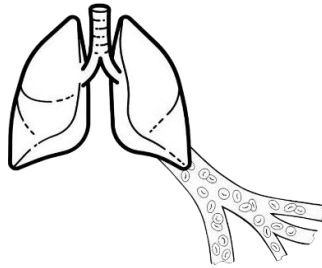




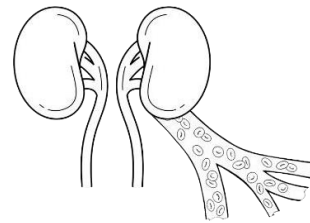
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13. Which of the following best illustrates how nutrients are delivered to the different parts of the body?

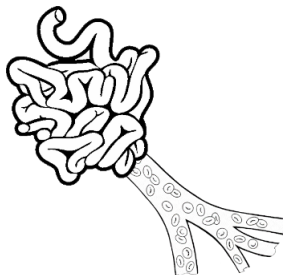
a.



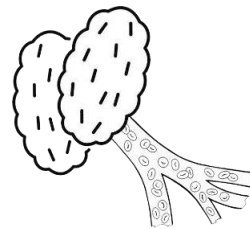
c.



b.



d.



14. Where does blood pick up hormones?

- a. Glands
- b. Kidneys

- c. Lungs
- d. Small Intestine

15. Which of the following statements is true about the digestive system?

- a. Digestive system releases hormones to the bloodstream.
- b. Digestive system releases nutrients to the bloodstream.
- c. Digestive system releases oxygen to the bloodstream.
- d. Digestive system releases urine to the bloodstream.

16. Pancreas secretes both pancreatic juice and insulin (hormone). What does this imply?

- a. Pancreas is both a part of the endocrine system and circulatory system.
- b. Pancreas is both a part of the digestive system and endocrine system.
- c. Pancreas is both a part of the endocrine system and nervous system.
- d. Pancreas is both a part of the digestive system and nervous system.



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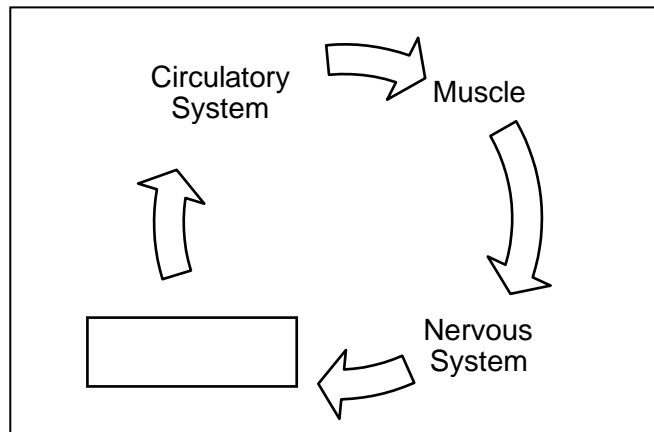
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17. What organ system will complete the process below for the muscles of the body to be supplied with oxygen?



- a. Urinary System
b. Nervous System
c. Digestive System
d. Respiratory System
18. How does the nervous system deliver information to the different organ systems?
a. through the alveoli
b. through the nerves
c. through the blood
d. through the villi
19. During systemic circulation, blood delivers oxygen to the different parts of the body and picks-up carbon dioxide. All the following are systemic circulation **EXCEPT**:
a. Renal Circulation
b. Cerebral Circulation
c. Pulmonary Circulation
d. Gastrointestinal Circulation
20. Why is there a need for portal hepatic circulation?
a. To deliver oxygen and nutrients to the liver
b. To deliver oxygen and hormones to the liver
c. To deliver nutrients and hormones to the liver
d. To deliver carbon dioxide and hormones to the liver






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TABLE OF SPECIFICATIONS
Science 6 Posttest

Competency: Explain how the different organ systems work together (S6LT-Ilc-d-2)

Item Placement	Remember	Understand	Apply	Analyze	Evaluate	Create
1	√					
2	√					
3				√		
4	√					
5	√					
6			√			
7		√				
8		√				
9				√		
10	√					
11				√		
12		√				
13			√			
14			√			
15	√					
16	√					
17						√
18		√				
19					√	
20	√					
Total	7	5	3	3	1	1

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POSTTEST
SCIENCE 6

Directions. Read each item carefully and choose the best answer.

1. Which of the following organ system breaks down nutrients from the food we eat?
 - a. Nervous System
 - b. Digestive System
 - c. Circulatory System
 - d. Respiratory System
2. What organ system of the body works with the circulatory system to deliver oxygen to the different parts of the body?
 - a. Nervous System
 - b. Digestive System
 - c. Circulatory System
 - d. Respiratory System
3. Which is the correct arrangement of how nutrients are delivered to the different parts of the body?

- I. Small intestine, with the help of digestive juices breaks down food into smaller substances.
 - II. The circulatory system through the blood delivers these nutrients to the different parts of the body.
 - III. Nervous system signals the digestive system to breakdown food to individual nutrients.
 - IV. Nutrients are released to the bloodstream to the different parts of the body.

 - a. I, II, III, IV
 - b. II, IV, I, III
 - c. III, I, IV, II
 - d. IV, III, II, I
4. Which of the following system controls and regulates the function of other systems of the body?
 - a. Urinary System
 - b. Nervous System
 - c. Endocrine System
 - d. Respiratory System
5. What system of the body produces urine from filtering blood?
 - a. Urinary System
 - b. Nervous System
 - c. Digestive System
 - d. Respiratory System



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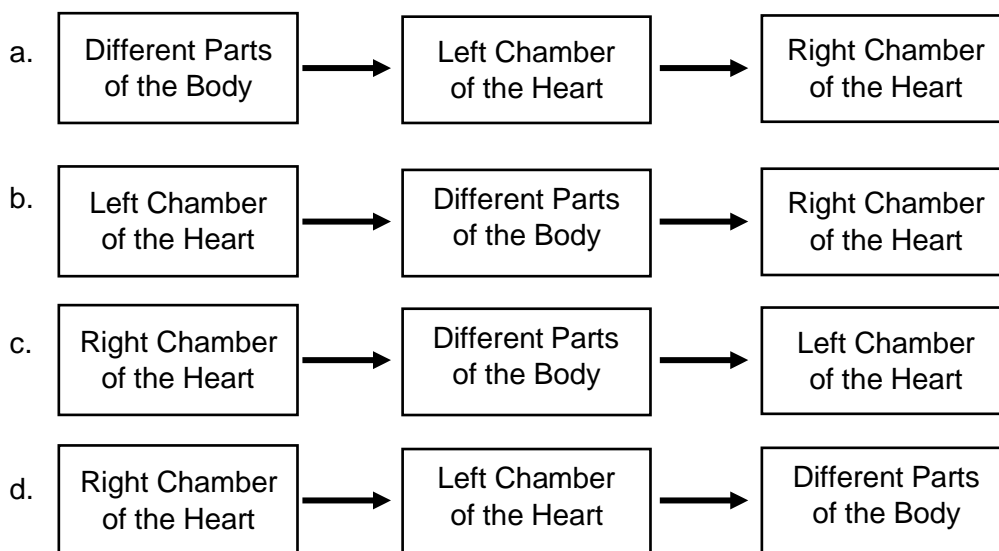
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6. Which of the following diagram shows the correct process of how exchange of gases occurs during systemic circulation?



7. Oxygen gets into the body through the respiratory system. They are delivered to the different parts of the body through the circulatory system. Where is oxygen stored before it gets into the bloodstream?
- a. Alveoli
b. Nephrons
c. Neurons
d. Villi
8. Which statement DOES NOT support the idea that systems work together as a unit to make sure the body keeps functioning?
- a. Digestive system breaks down and dissolves food for the use of the different parts of the body.
b. Circulatory system delivers all the necessary materials to and from the different parts of the body.
c. Urinary system filters and excretes its own waste from the body and produces nutrients for its function.
d. Endocrine system produces hormones which carries information on what action every part of the body will do.
9. Which pairing does not belong to the group?
- a. Kidneys and bile
b. Glands and hormones
c. Lungs and oxygen
d. Small Intestine and nutrients



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10. Where does circulatory system collect the materials needed by the body to function?

- a. Glands, lungs, and brain
- b. Small intestine, glands, and lungs
- c. Brain, small intestines, and glands
- d. Kidneys, small intestine, and lungs

11. Nutrients give energy to the body. Which may hinder the delivery of nutrients to the different parts of the body?

- I. When the heart stops beating.
- II. When the kidneys stop filtering.
- III. When the brain stops functioning.
- IV. When the small intestine stops digesting.

- a. I and II
- b. III and IV
- c. I, II and III
- d. I, II, III and IV

12. Why is there a need for coronary circulation?

- a. To deliver bile and hormones to the heart
- b. To deliver oxygen and nutrients to the heart
- c. To deliver nutrients and carbon dioxide to the heart
- d. To deliver carbon dioxide and hormones to the heart

13. Roy's lungs are already damaged. Which of his organ system will not be served properly and why?

- a. endocrine system because hormones will not be formed completely
- b. digestive system because urine will not be able to collect the nutrients from it
- c. respiratory system because it can't get enough oxygen into the blood
- d. circulatory system because blood will be filled-up with excess water and waste materials

14. Where does blood picks-up nutrients?

- a. Glands
- b. Kidneys
- c. Lungs
- d. Small Intestine



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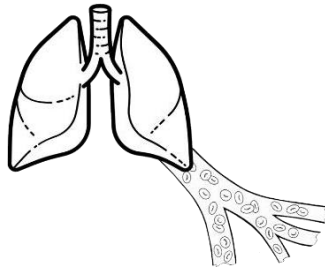




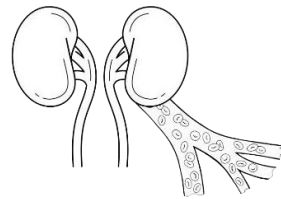
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15. Which of the following best illustrates how hormones are delivered to the different parts of the body?

a.



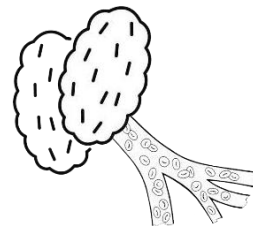
c.



b.



d.



16. How does the nervous system deliver information to the different organ system?

- a. through the alveoli
- b. through the nerves
- c. through the blood
- d. through the villi

17. Which of the following statement is true about the endocrine system?

- a. Endocrine system releases hormones to the bloodstream
- b. Endocrine system releases nutrients to the bloodstream
- c. Endocrine system releases oxygen to the bloodstream
- d. Endocrine system releases urine to the bloodstream



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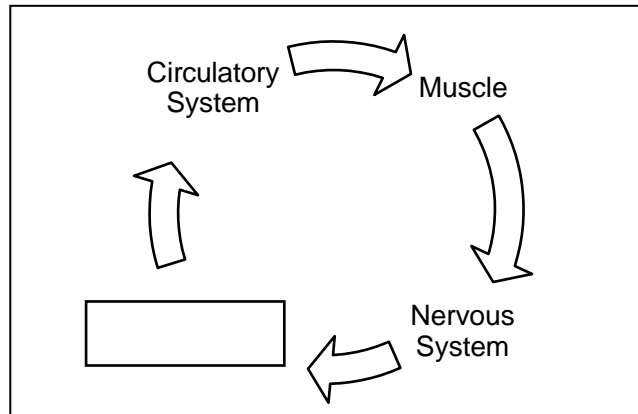
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18. What organ system will complete the process below for the muscle to be supplied with nutrients?



- a. Digestive System
 - b. Nervous System
 - c. Respiratory System
 - d. Urinary System
19. Pituitary gland regulates body functions and produces hormones. What does this imply?
- a. Pituitary gland is both a part of the endocrine system and circulatory system
 - b. Pancreas is both a part of the digestive system and endocrine system
 - c. Pancreas is both a part of the endocrine system and nervous system
 - d. Pancreas is both a part of the digestive system and nervous system
20. Blood gives off carbon dioxide and pick-ups oxygen during what kind of circulation?
- a. Cerebral Circulation
 - b. Gastrointestinal Circulation
 - c. Pulmonary Circulation
 - d. Renal Circulation



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SURVEY QUESTIONNAIRE

Name (optional): _____

Section: _____

Intervention Material: ☐ Storybook ☐ Story Animation ☐ slide decks

1. What did you like about the material?

(Ano ang mga nagustuhan mo sa materyal?)

2. What did you dislike about the material?

(Ano ang mga hindi mo nagustuhan sa materyal?)



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RAW SCORES

STUDENT NUMBER	CONTROL GROUP		EXPERIMENTAL GROUP 1		EXPERIMENTAL GROUP 2	
	Pretest	Posttest	Pretest	Posttest	Pretest	Posttest
1	14	17	13	19	14	20
2	12	14	10	19	13	19
3	13	13	10	18	12	19
4	10	12	13	18	11	18
5	12	12	9	17	12	18
6	7	12	11	17	11	18
7	11	12	12	16	10	17
8	11	12	8	16	10	16
9	11	11	9	15	8	15
10	8	10	10	15	9	15
11	3	9	11	15	8	14
12	9	9	11	15	7	14
13	6	9	3	13	4	13
14	7	8	6	12	3	12
15	5	7	4	11	7	12


JHEMAICCA MAE F. VERONILLA
Grade VI-Infra (Control Group) Secretary


MAZELLE DADO-ACON
Grade VI-Gamma (Experimental Group 1) Secretary


SHEZMYDELIGHT C. BINARAO
Grade VI-Delta (Experimental Group 2) Secretary



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