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Improvisation Of Visual Aids On Organ Systems Using Recyclable Materials: A Step-By-Step Instructional Guide

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Abstract

Science is one of the most important learning areas in the curriculum in all levels of education. This is essential because of the fact that various activities in human life involve knowledge of Science. This study aimed to develop and validate a step-by-step instructional guide which can be used by learners in improvising visual aids (models) on organ systems of the human body. Further, the study made use of the research and development (R&D) method also known as Research-Based Methodology. The study reveals that the developed step-by-step instructional guide was highly valid and highly acceptable. It was also found out that functional visual aids (models) of the organ systems of the human body can be improvised through the use of recyclable materials. The visual aids (models) improvised by the researchers were also rated by the pool of evaluators to be highly usable and highly acceptable.

Keywords : development, improvisation, visual aids, acceptability, usability, validity

INTRODUCTION

One of the most important learning areas in the curriculum in all levels of education is Science. This is considered essential because of the fact that various activities in human life involve knowledge of Science. The progress and development of a country is linked with science and technology. It is imperative therefore that human capital of a country should be equipped with science and technological competencies so that they could become productive and contributing members of society. It is in this regard that the State puts emphasis on the teaching of science and technology to learners in all levels.

Section 17, Article 11 of the 1987 Constitution of the Philippines states that "the State shall give priority to education, science, and technology, arts, culture, and sports to foster patriotism and

nationalism, accelerate social progress and promote the total human liberation and development."
Taking into consideration the value of science and technology to an individual and society's progress and development, it is of great importance to teach the subject in the most effective way. In this line, the Department of Education, being the arm of the government in providing quality basic education to learners, exerted efforts to formulate policies and craft programs that will lead to an improved teaching of science and technology.

In response to the calling of providing quality education, teachers keep on seeking new ways to improve instruction. In spite of all the policies and programs implemented, results of international and national assessments showed that Filipino learners lower performance in Science compared to their counterparts in other countries. The results of the 2018 showed that Filipino learners performed lowest in reading comprehension and second to the lowest in science and mathematics among the 79 participating countries.

To address the issue, the Department of Education (DepEd) created a technical working committee tasked to craft a policy or program that aims to improve the quality of Filipino learners' performance in these vital learning areas. One of the programs crafted and implemented is the SulongEdukalidad. This program gave focus in four key areas – the review and updating of the K to 12 program, the improvement of learning facilities, upskilling and reskilling of teachers and school heads, and the engagement of stakeholders.

The upskilling and reskilling of teachers is given emphasis in this program because of the belief that their competencies and attitudes toward teaching and learning contribute much in the attainment of quality education. It is a fact that cannot be denied that the most important factor in the educative process is the teacher. He/She does not only take charge in assigning lessons to learners and checks whether they master the lessons or not. He/She has to see to it the materials he/she needs are appropriate and accurate to the concepts to be taught.

Undoubtedly, instructional materials are vital in the teaching and learning process. They serve as support in learning the content and allow students to get engage in the application of concepts. They are developed and/or prepared to facilitate learner understanding of the lessons presented. It is imperative then teachers should select learning/instructional materials that are appropriate to the lessons to be taught.

Instructional materials come in various types. They could be printed or non-printed materials. Real objects are considered the best instructional materials to use in teaching. However, there are lessons, especially in science, in which the use of this type of materials is not possible. Thus, there is a need to develop/improvise or purchase materials that represent the desired one.

Most science concepts can be taught effectively through the use of models. A model is a representation of an idea, object, event, process, or system. They play a crucial role in science (TKI Te Keti Ipurangi, n.d.). One of the lessons in science in all levels that require the use of models are the different organ systems of the body. In order for learners to understand how these organ systems function, learners need materials that will help them visualize the concepts. Hence, there is a need for models of organ systems for the learners and teachers to manipulate. However, models are expensive. It is, therefore, imperative that teachers will make use of their ingenuity,

creativity, and resourcefulness.

Models of organ systems can be improvised out of recyclable materials found in the environment. If accurately prepared, they may approximate the commercial ones. Learners, especially those in the secondary level could be of great help to teachers in the improvisation of these instructional materials. If properly guided, they will be able to produce accurate outputs. It is in this premise that the researchers were motivated to conduct this study which intends to develop a step-by-step instructional guide for learners to use in improvising models for the different organ systems of the human body. Likewise, the researchers will improvise themselves the models which will serve as examples to the learners. The levels of usability and acceptability of the improvised models will also be established in this study.

STATEMENT OF THE PROBLEMS

This study aimed to develop and validate a step-by-step instructional guide on improvising visual aids (models) on organ systems of the human body. Likewise, the study established the usability and acceptability of the visual aids (models) the researchers improvised out of recycled materials.

Specifically, the study sought answers to the following questions:

1. What is the level of validity of the developed step-by-step instructional guide in improvising visual aids
   (models) on organ systems out of recyclable materials in terms of:
   a. Objectives;
   b. Content and Organization;
   c. Design, and
   d. Technical Appropriateness?
2. What is the level of acceptability of the step-by-step instructional guide in improvising visual aids
   (models) on organ systems using recyclable materials in terms of:
   a. Language;
   b. Usefulness, and
   c. Graphics?
3. What are the features of the improvised visual aids (models) on organ systems out of recyclable materials along:
   a. Materials Used;
   b. Production of the Material, and
   c. Procedure/Manner of Using?
4. What is the level of usability of the developed visual aids using recyclable materials in terms of
   a. Accuracy and Visual Appeal;
   b. Alignment to the Curriculum.
   c. User-Friendly, and
   d. Engagement?

5. What is the level of acceptability of the improvised instructional materials for the organ system
    a. Content;
    b. Design;
    c. Relevance, and
    d. Novelty?

METHODS

Research Design

The aim of this study is the development and validation of a step-by-step instructional guide on the improvisation of visual aids (models) on organ systems of the human body. Likewise, it aimed also to improvise visual aids (models) of organ systems of the human body to be used as samples to learners. The levels of usability and acceptability of the improvised visual aids (models) were also determined. The aims of the study suggest the use of the Research and Development Methodology, often called the Research-Based Methodology.

A. Najib Tuanany (2019) defined Research and Development Methodology as a process used to develop and validate educational products. It is a strategy used to increase the educational quality, besides developing and validating the educational output. The steps in this process are: 1) studying research findings pertinent to the product based on these findings; 2) field testing the product in the setting where it will be used eventually, and 3) revising it to correct deficiencies found in the field testing stage. This cycle is repeated until the field data indicates that the product meets the behaviorally defined objective.

Research Site and Participants

This study was conducted at the Urdaneta City National High School, Urdaneta City, Pangasinan. Three school heads, two department heads in science, four master teachers in science, and one science professor of PSU-Urdaneta Campus served as respondents of the study. They assessed the validity of the developed step-by-step instructional guide and its level of acceptability. They also assessed the levels of usability and acceptability of the visual aids (models) on organ systems of the human body improvised by the researchers out of recyclable materials. The visual aids (models) improvised in this study were the digestive, respiratory, reproductive, and integumentary systems of the human body.

Data Collection and Analysis

This study made use of an Experts' Assessment Checklist in which the researchers adopted the criteria suggested by Eisner (1987), as cited by Ferrer (2014). However, they added some indicators in each of the criterion to suit the need of the study. The instrument constructed was submitted for content validation by a pool of evaluators. The evaluators' ratings obtained an average of 2.93, hence, the instrument was considered valid in establishing the validity and

acceptability of the instructional guide and the levels of usability and acceptability of the improvised visual aids out of recyclable materials. After establishing the content validity of the data gathering instrument, the researchers requested permission from the Office of the Schools Division Superintendent to conduct the study. Upon approval of the request, a copy of the step-by-step instructional guide and the assessment checklist was provided to them so they could rate its validity and acceptability. Likewise, the visual aids (models) improvised by the researchers out of recyclable materials were shown to each evaluator for their assessment in terms of usability and acceptability. The data collected were submitted to appropriate statistical treatment.

Development and Validation of the Step-by-Step Instructional Guide

The study will undergo three stages, to wit: planning; developing; and validating.

A. Planning Stage

Step1. **Preliminary Stage.** The researchers examined the content and content standards, and learning competencies in K to 12 Science Curriculum Guide, specifically on the lessons on the various organs of the human body. After identifying the content and performance standards, and the learning competencies on the lessons on the organ systems of the body, the researchers consulted their adviser/professor as to how the step-by-step instructional quide will be best developed.

Step 2. **Detailed Production Specifications.** An analysis of commercial visual aids (models) on organ systems was conducted by the researcher to formulate guidelines, technical details, management and techniques of the presentation of the instructional guide and the graphics to be used.

B. Development Stage

Step 3. **Producing the Step-by-Step Instructional Guide and Improvising the Visual Aids (Models).** After analyzing commercially available visual aids (models) and consulting their adviser/professor, the researchers started developing the instructional guide and improvising the visual aids (models). After the first draft of the instructional guide was produced and the visual aids were improvised, the researchers sought the help of their adviser/professor, a science department head, and a master teacher in science to edit the guide and assess the visual aids (models). Their comments, suggestions and or recommendations were incorporated in the second draft and in refining the improvised visual aids (models).

C. Validation Stage

Step 4. **Validation of the Step-by-Step Instructional Guide and the Improvised Visual Aids.** The second draft and the improved visual aids (models) were submitted to a pool of evaluators composed of three school heads, two department heads in science, four master teachers in science,

from Urdaneta City National High School and one science professor of PSU-Urdaneta Campus for them to assess the validity and acceptability of the developed instructional guide and the usability and acceptability of the improvised visual aids (models) on organ systems of the human body. They made use of an assessment checklist constructed by the researchers.

Step 5.**Revision of the Step-by-Step Instructional Guide and the Improvised Visual Aids (Models).**The pooled opinions of the evaluators were the bases for further revision of the instructional guide and the improvised visual aids (models).

Step 6.**Final Revision of the Step-by-Step Instructional Guide and the Improvised Visual Aids (Models).** The final form of the instructional guide and the improvised visual aids (models) were prepared based from the comments and suggestions of the evaluators and their adviser/professor.

Findings And Discussion

The findings of the study showed that the developed step-by-step instructional guide on the improvisation of visual aids (models) on organ systems of the human body was rated highly valid in terms of objectives, content and organization, design, and technical appropriateness. The instructional guide was rated also by the pool of evaluators as highly acceptable in terms of the language used, usefulness, and graphics.

Visual aids (models) on organ systems of the human body, as found in the study, can be improvised out of "found objects." The results of the study showed that the visual aids (models) on organ systems of the human body improvised by the researchers were rated by the respondents as highly usable in terms of the criteria accuracy and visual appeal, alignment to the curriculum, user-friendly, and engagement. With to their level of acceptability, the visual aids (models) were rated as highly acceptable in terms of content, design, relevance, and novelty.

Level of Validity of the Developed Step-by-Step Instructional Guide

On Objectives. The findings of the study showed that in terms of objectives, the computed over-all weighted mean of 4.82, the pool evaluators strongly agreed that the guide is highly valid.

Table 1 : Level of Validity of the Step-by-Step Instructional Guide in Terms of Objectives

		SA	**A**	**U**	**D**	**SD**		
No.	**Indicators**	**5**	**4**	**3**	**2**	**1**	**WM**	**DE**
1	The objectives are clearly stated.	**8**	2	0	0	0	4.80	SA
2	The objectives are measurable and attainable.	**9**	1	0	0	0	4.90	SA
3	The statements considered the taxonomy of learning objectives.	**8**	1	1	0	0	4.70	SA

4	The objectives take into account the learning competencies on the lessons on organ systems of the human body.	**10**	0	0	0	0	5.00	SA
5	The objectives are appropriate.	**7**	3	0	0	0	4.70	SA
	Overall Weighted Mean						**4.82**	**SA/ HV**

On Content and Organization. In terms of content and organization, the guide was rated highly valid as evidenced by the computed overall weighted mean which is 4.88.

Table 2: Level of Validity of the Step-by-Step Instructional Guide in Terms of Content and Organization

		SA	**A**	**U**	**D**	**SD**		
No.	**Indicators**	**5**	**4**	**3**	**2**	**1**	**WM**	**DE**
1	The step-by-step instructional guide contains the required elements.	**10**	0	0	0	0	5.00	SA
2	The steps of the instructional guide are clearly stated.	**7**	3	0	0	0	4.70	SA
3	The steps are stated in simple sentences.	**10**	0	0	0	0	5.00	SA
4	The steps follow logical sequence.	**9**	1	0	0	0	4.90	SA
5	The steps are easy for the learners to follow.	**8**	2	0	0	0	4.80	SA
	Overall Weighted Mean						**4.88**	**SA/ HV**

On Design. With regards to its design, the step-by-step instructional guide was rated as highly valid as shown by the weighted mean of 4.78.

Table 3: Level of Validity of the Step-by-Step Instructional Guide in Terms of Design

		SA	**A**	**U**	**D**	**SD**		
No.	**Indicators**	**5**	**4**	**3**	**2**	**1**	**WM**	**DE**
1	The visual elements are attractive.	7	3	0	0	0	4.80	SA
2	The size of the step-by-step instructional guide is appropriate to the intended user.	8	2	0	0	0	4.80	SA
3	The print is readable and legible.	10	0	0	0	0	5.00	SA
4	The design facilitates understanding of the procedure in improvising the visual aids (models).	8	1	1	0	0	4.70	SA
5	The design motivates the learners to do the activity.	8	2	0	0	0	4.80	SA
								SA/

	Overall Weighted Mean						**4.78**	**HV**

On Technical Appropriateness. As to technical appropriateness, it was rated as highly valid as indicated by the over-all weighted mean which is 4.90.

Table 4 : Level of Validity of the Step-by-Step Instructional Guide in Terms of Technical Appropriateness

		SA	**A**	**U**	**D**	**SD**		
No.	**Indicators**	**5**	**4**	**3**	**2**	**1**	**WM**	**DE**
1	Visual presentations are incorporated in the step-by-step instructional guide.	10	0	0	0	0	5.00	SA
2	The illustrations of the developed step-by-step instructional guide serve as useful guide to its procedure/mechanics.	9	1	0	0	0	4.90	SA
3	Graphics and color are used in the instructional guide.	8	2	0	0	0	4.80	SA
	Overall Weighted Mean						**4.90**	**SA/ HV**

Summary of the Level of Validity. As a whole, the step-by-step instructional guide was rated by the pool evaluators as highly valid as shown by the genral mean of their ratings which is 4.85

Table 5 : Summary of the Evaluators' Ratings on the Level of Validity of the Step-by-Step Instructional Guide

No.	**Indicators**	**OWM**	**DE**
A	Objectives	4.82	Strongly Agree/Highly Valid
B	Content and Organization	4.88	Strongly Agree/Highly Valid
C	Design	4.78	Strongly Agree/Highly Valid
D	Technical Appropriateness	4.90	Strongly Agree/Highly Valid
	General Mean	**4.85**	**Strongly Agree/Highly Valid**

Level of Acceptability of the Developed Step-by-Step Instructional Guide

On Language. As to the acceptability of the step-by-step instructional guide on improvisation of visal aids (models) out of recyclable material, the pool of evaluators rated it as highly acceptable in terms of language as evidenced by the overall weighted mean which is 4.84.

Table 6 : Level of Acceptability of the Step-by-Step Instructional Guide in Terms of Language

		SA	A	U	D	SD		
No.	**Indicators**	**5**	**4**	**3**	**2**	**1**	**WM**	**DE**
1	The language used is within the comprehension level of the target users.	**9**	1	0	0	0	4.90	SA
2	The terms/words used in the steps/procedure are behaviorally stated.	**8**	2	0	0	0	4.80	SA
3	The language used in the instructional guide is appropriate to the steps to be followed by the learners.	**7**	3	0	0	0	4.80	SA
4	The language used keeps the interest of the learners in completing the improvised visual aids (models).	**10**	0	0	0	0	5.00	SA
5	The language used in presenting the steps to be followed observes organization and cohesion of ideas.	**9**	1	0	0	0	4.90	SA
	Overall Weighted Mean						**4.84**	**SA/HV**

On Usefulness. In terms of usefulness, the instructional guide was rated highly acceptable as shown by the overall weighted mean which is 4.93.

Table 7: Level of Acceptability of the Step-by-Step Instructional Guide in Terms of Usefulness

		SA	A	U	D	SD		
No.	**Indicators**	**5**	**4**	**3**	**2**	**1**	**WM**	**DE**
1	The step-by-step instructional guide can be used by any learner or teacher who would like to improvise the same materials.	**10**	0	0	0	0	5.00	SA
2	The instructional guide enhances learners' creativity and logical thinking.	**8**	2	0	0	0	4.80	SA
3	It can be used by the learners alone during their free time.	**10**	0	0	0	0	5.00	SA

	Overall Weighted Mean						**4.93**	**SA/HA**

On Graphics. As to graphics, the computed overall weighted mean indicates that the instructional guide is highly acceptable.

Table 8 : Level of Acceptability of the Step-by-Step Instructional Guide in Terms of Graphics

		SA	**A**	**U**	**D**	**SD**		
No.	**Indicators**	**5**	**4**	**3**	**2**	**1**	**WM**	**DE**
1	The use of the graphics enhances the presentation of the step-by-step instructional guide.	9	1	0	0	0	4.90	SA
2	The graphics helps the learners in following the procedure easily.	10	0	0	0	0	5.00	SA
3	The graphics motivates the learners to perform the tasks of improvising visual aids out of recyclable materials.	10	0	0	0	0	5.00	SA
4.	The graphics helps the learners in visualizing the concepts.	10	0	0	0	0	5.00	SA
5	The graphics are suited to the steps to be followed.	10	0	0	0	0	5.00	SA
	Overall Weighted Mean						**4.98**	**SA/HA**

Summary of the Level of Acceptability. Taken as a whole, the computed general mean of 4.92 shows that the instuctional guide developed is highly acceptable.

Table 9: Summary of the Evaluators' Ratings on the Level of Validity of the Step-by-Step Instructional Guide

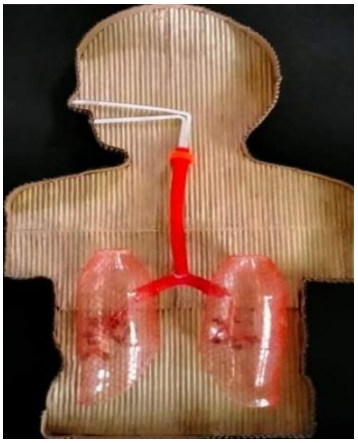
No.	**Indicators**	**OWM**	**DE**
A	Language	4.84	Strongly Agree/Highly Acceptable
B	Usefulness	4.93	Strongly Agree/Highly Acceptable
C	Graphics	4.98	Strongly Agree/Highly Acceptable

	Grand Mean	**4.92**	Strongly Agree/Highly Acceptable

Features of the Improvised Visual Aids (Models) on the Organ Systems of the Human Body

The circulatory system which can be used to show the role of each part of the body and how they function were made out of found objects" such as water bottle, funnel, etc. except for the illustration board and the plastic cover, duct tapes, and rubber bands. To show the how it works, the improvised visual aid could be used by filling the pump device with water mixed with red food coloring and pumping the colored water in the constructed pump device. This is done to show how blood circulates in the different parts of the body and the roles of the heart and the lungs in blood circulation. With regards to the other visual aids, they were only used to show the parts of the body involve in the functions of the systems.

Table 10: Features of the Improvised Visual Aids (Models)

Types of Visual Aid	Description of Its Features
A Model of the Respiratory System The improvised visual aid will be used to teach the lesson on the circulatory system. The learners will be able to visualize through this material how blood will circulate in the different parts of the body 	**A. Materials Used** Plastic bottle, Funnel Illustration board and plastic cover, aquarium tubing or straw Duct tape, pair of scissors, rubber bands **B. How to Prepare** 1. Draw or trace an outline of a human body on an illustration board. Cover it with a plastic. 2. Design and construct a pump device lungs using water bottle/gallon/gloves and blood vessels using aquarium tubing or straw. Connect them using duct tape and rubber bands. The pump device will move the air through the constructed respiratory system. 3. Place the constructed respiratory system on top of the illustration board body.
	C. How to Use It 1. Fill up the pump device and vessels with colored water using the funnel until little air remains in the system. 2. Pump the colored water in the constructed pump device so it will move to the lungs going to the different parts of the body through the blood vessels (tubings or straws).

	3. Use this to explain the pathway of blood from the heart to the different parts of the body and back to the heart.
B. Digestive System  	**A. Materials Used** Empty toothpaste tube – Mouth Used small light bulb- Salivary Glands Thin PVC hose (clear) – Esophagus and Food Pipe Small clear bottle- Liver 2 small bottle caps – Gallbladder Empty Soft drink can- Stomach Empty Stick glue – Pancreas Orange flexible hose (small/large)- Intestine Empty Dutch mill with straw – Rectum and Anus Illustration board – Man Other Materials Used: Scissors, Glue stick, Glue gun, Glue, Scotch tape Colored paper, Marker, Cutter, Candle **B. How to Prepare** 1. Use an empty toothpaste tube for the mouth, a used lightbulb for the salivary glands, a thin PVC hose for the esophagus, an empty soda can for the food pipe, a small bottle to represent the liver, two bottle caps for the gall bladder, and an empty can for the stomach. 2. Make four holes in the empty can to let the clear PVC hose connect the different organs from the stomach to the gallbladder, liver, and pancreas which provide digestive juices. An empty stick glue was used for the pancreas, an extra flexible hose for the small and large intestine. 3. To see the difference between the small intestine and the large intestine, cut a thin portion of the flexible hose for the representation of the small intestine and glue it to a clear PVC hose. For the rectum and anus, an empty dutch mill was used. 4. Use a stick and door hinge as a stand of the model.
C. INTEGUMENTARY SYSTEM	**A. Materials Used** Used Foam Mats, Dried Corn Kernels, Black plastic tub, Manila Paper, Red and Blue Yarn

	Cardboard, White sack, Old box Other Materials Used: Scissors, Glue Gun, Glue Stick **B. How to Prepare** 1. Prepare all raw materials. 2.Cover an old box with manila paper and white sack 3. Cut all the raw materials required to assemble the different parts of the Integument System. Cut using a pair of scissors the black plastic tub as hair follicles, glue the dried corn kernels at the lower portion of the box to represent the subcutaneous tissue layer, red and blue yarn to represent the nerve, and used foam mats to represent the epidermis. 4. Use cardboard to strengthen the model, glue gun/glue stick to pastere presentations (parts) at the box to complete the model.
D. FEMALE REPRODUCTIVE 	**A. Materials Used** Styrofoam, Plastic bottles, Illustration board, Different beads, Poster paint & paintbrush, Stick glue and wood glue, Used bond papers **B. How to Prepare** 1. Cut plastic bottle into a shape which resembles the fallopian tube. Cover it with used bond papers using wood glue. 2. Make a lining of the tube using styrofoam. Paint. 3. Make the ovaries by cutting the styrofoam. Paste beads on it to represent the egg cells. 4. Shape or form a uterus using styrofoam. Paint. 5. Connect the different parts to assemble the female reproductive system. 6. Place the constructed female reproductive system on top of the illustration board using stick glue.

E. MALE REPRODUCTIVE SYSTEM	A. Materials Used
	Styrofoam, Plastic bottles, Illustration board, Hose or aquarium tubing, Paint & paintbrush, Stick glue **B. How to Prepare** 1. Draw and cut an outline of the male reproductive system on a Styrofoam. 2. Use plastic bottle by cutting it into desired shape of the different parts of the male reproductive system. 3. Paint the different parts. 4. Connect the different parts and the aquarium tubing or hose to assemble the male reproductive system. 5. Place the constructed male reproductive system on top of the illustration board using stick glue.

Level of Usability of the Improvised Visual Aids (Models)

Table 11 presents the summary of the computations on the level of usability of the improvised visual aids in terms of these criteria: accuracy and visual appeal, alignment to curriculum, user-friendly, and engagement.

Table 11 : Level of Usability of the Improvised Visual Aids (Models) on the Organ Systems

No	Indicators	SA	A	U		
	A. Accuracy and Visual Appeal	5	4	3	WM	DI
	The improvised visual aids...					
1	have no errors in its preparation and functioning	5	3	2	4.30	VMU
2	provide complete and accurate information.	7	2	1	4.60	VMU
3	have strong visual appeal.	8	2	0	4.80	VMU
	Overall Weighted Mean				4.57	VMU
	B. Alignment to the Curriculum					
	The improvised visual aids...					
1	are aligned to the competencies prescribed in the K-12 Science Curriculum	9	1	0	4.90	VMU
2	efficiently address the competencies to be developed to the learners.	10	0	0	5.00	VMU

3	provide appropriate depth of knowledge and skills	9	1	0	4.90	VMU
	Overall Weighted Mean				4.93	VMU
	C. User-Friendly					
	The improvised visual aids...					
1	are easy for teachers and learners to use	10	0	0	5.00	VMU
2	have complete set of easy-to-follow instructions on how to use them.	8	1	1	4.70	VMU
	Overall Weighted Mean				4.85	VMU
	D. Engagement					
	The improvised visual aids...					
1	spark learners interest	9	1	0	4.90	VMU
2	are relevant	8	1	1	4.70	VMU
3	are developmentally approriate	10	0	0	5.00	VMU
4	can be used individually or by group and require movement	9	1	0	4.90	VMU
	Overall Weighted Mean				4.88	VMU
	Grand Mean				4.81	VMU

On Accuracy and Visual Appeal. In terms of accuracy and visual appeal, the improvised visual aids (models) are very much usable as shown by the overall weighted mean which is 4.57.

On Alignment to Curriculum. As to alignment to the curriculum, the computed overall weighted mean of 4.93 indicates that the improvised visual aids (models) are very much usable.

On user-Friendly. With regards to the criterion user-friendly, the overall weighted mean of the indicators which is 4.85 shows that the improvised visual aids (models) are very much usable.

On Engagement. In terms of the criterion engagement, the pool of evaluators rated the improvised visual aids (models) very much usable as evidenced by the computed overall weighted mean of 4.88.

As a whole, the computed general mean which is 4.81 indicates that the visual aids (models) improvised by the researchers out of recyclables are very much usable in teaching the lessons on organ systems of the body.

Level of Acceptability of the Improvised Visual Aids (Models)

Table 12 presents the criteria of the level of acceptability of the improvised visual aids (models), the scales and their corresponding frequencies, weighted means, and interpretations.

Table 12: Level of Acceptability of the Improvised Visual Aids (Models) on the Organ Systems of the Human Body

	Indicators	VMA	MA	Mod A		
	A. Content	5	4	3	WM	DI
	The content of the improvised visual aids...					
1	accurately represent the domain of knowledge and events.	7	2	1	4.60	VMA
2	include generally accepted and prevalent truths, major concepts, and skills.	8	2	0	4.80	VMA
	Overall Weighted Mean				4.70	VMA
	B. Design					
	The design of the improvised visual aids...					
1	text and picture/models used are big enough to be seen by the farthest learner	9	1	0	4.90	VMA
2	pictures/models used are proportionate with the other materials or pictures used in the materials	8	1	1	4.70	VMA
3	are colorful; colors used are life-like and harmonious, and facilitate understanding	10	0	0	5.00	VMA
	Overall Weighted Mean				4.87	VMA
	C. Relevance					
	The improvised visual aids...					
1	are up-to-date	9	1	0	4.90	VMA
2	are related to the lesson in particular and to the specific needs and experiences of the learners	8	2	0	4.80	VMA
	Overall Weighted Mean				4.85	VMA
	D. Novelty					
	The improvised visual aids...					
1	possess an element of newness	9	1	0	4.90	VMA
2	arouse the curiosity and sense of discovery of the learners	10	0	0	5.00	VMA
	Overall Weighted Mean				4.95	VMA
	Grand Mean				4.84	VMA

On Content. The improvised visual aids (models) in terms of content were very much acceptable as evidenced by the computed overall weighted mean of 4.70.

On Design. With regards to the design of the developed visual aids (models) the improvised visual aids (models) were rated very much acceptable as shown by the overall weighted mean which is 4.87.

On Relevance. As to the criterion relevance, the overall weighted mean of 4.85 indicates that the improvised visual aids (models) were perceived by the pool of evaluators to be very much acceptable.

On Novelty. In terms of the criterion novelty, the pool of evaluators rated the improvised visual aids (models) as very much acceptable as evidenced by the computed weighted mean of their ratings in all the indicators which is 4.95. The general mean of the ratings of the pool of evaluators which is 4.84 indicates that the improvised visual aids (models) are rated by them to be very much acceptable.

CONCLUSION

This study aimed to determine the validity and acceptability of the step-by-step instructional guide on the improvisation of visual aids (models) on organ systems of the human body out of recyclable materials. The instructional guide, therefore, could be used by the learners even when they work on their own during their off class hours.. It likewise established the level of usability and acceptability of the visual aids (models) on organ systems out of recyclable materials improvised by the researchers. Based from the findings of the study, the researcher concluded that the step-by-step instructional guide developed by the researchers is highly valid and highly acceptable. Instructional materials in science can be improvised out of "found objects/recyclables." The developed visual aids (models) from recyclables are highly usable and highly acceptable for teachers and learners to use in the teaching and learning process. These could be of great help in visualizing abstract concept in science. Based from the conclusions made, school administrators may encourage Science teachers to developed guides and manuals appropriate for the performance tasks provided to learners every quarter and submit it for content validation. These will surely motivate learners to complete their tasks especially when the guides or manuals prepared are validated. Additionally, they should encourage teachers to improvise more instructional materials using "found objects/recyclables." Moreover, they should allocate a part of the M.O.O.E. of the school in support to the improvisation of these learning materials. Lastly, school administrators may recommend to higher authorities that efforts of teachers in improvising instructional materials may be recognized by giving awards of recognition in proper forum. Considering the high cost of commercial instructional materials, teachers may continue improvising more science instructional materials for them to use in teaching the different science competencies. They may encourage their students and parents to do the same so they could tap their creativity and resourcefulness. However, Based from the conclusions made, school administrators may encourage Science teachers to developed guides and manuals appropriate for the performance tasks provided to learners every quarter and submit it for content validation. These will surely motivate learners to complete their tasks especially when the guides or manuals prepared are validated. Additionally, they should encourage teachers to improvise more instructional materials using "found objects/recyclables." Moreover, they should allocate a part of the

M.O.O.E. of the school in support to the improvisation of these learning materials. Lastly, school administrators may recommend to higher authorities that efforts of teachers in improvising instructional materials may be recognized by giving awards of recognition in proper forum. Considering the high cost of commercial instructional materials, teachers may continue improvising more science instructional materials for them to use in teaching the different science competencies. They may encourage their students and parents to do the same so they could tap their creativity and resourcefulness. However, it would be better if they prepare step-by-step instructional guide and provide it to the learners.

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