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Home-Based Learning Activities (H-BLA) in Teaching Physics Topics for Elementary School Students

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ABSTRACT

Purpose of the study: This study developed and validated Home-Based Learning Activities (H-BLA) for teaching Physics inspired by the identified Most Essential Learning Competencies (MELCs) by the Department of Education (DepEd). Acknowledging the significance of adaptive and suitable learning materials.

Methodology: The researchers employed the descriptive-developmental method to create and assess the developed home-based learning activities. The Learning Resources Management and Development System (LRMDS) evaluation tool of the Department of Education (DepEd) for printed materials is used and experts agreed that the developed H-BLA met the standards for printed learning materials.

Main Findings: The expert validation revealed that the Home-Based Learning Activities (H-BLA) were highly acceptable in terms of content, format, accuracy, and up-to-datedness of information, with Factors 1, 2, and 4 receiving 'very satisfactory' ratings. However, the presentation and organization, corresponding to Factor 3, received only a 'satisfactory' rating, indicating room for improvement in the structure and flow of the materials.

Novelty/Originality of this study: The study's novelty lies in developing validated Home-Based Learning Activities (H-BLA) for elementary Physics under the K-12 curriculum, utilizing accessible materials to foster independent learning. Grounded in Constructivist Theory, Dale's Cone of Experience, and Contextualized Teaching and Learning, it promotes experiential education. Expert validation and iterative improvement ensure quality, addressing gaps in remote and practical science education.

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1. INTRODUCTION

In early 2020, the global landscape of education underwent an unprecedented transformation due to the COVID-19 pandemic, disrupting conventional face-to-face instruction and accelerating the shift to remote and flexible learning environments [1]. As schools closed to curb the virus's spread, the traditional classroom setup was rapidly replaced by online platforms and modular learning systems. This sudden transition compelled educational institutions to rethink instructional delivery to ensure learning continuity amid uncertainty. In the Philippines, the Department of Education (DepEd) institutionalized flexible learning modalities through DepEd

Order No. 018, s.2020, which emphasized the use of printed and digital materials that cater to learners' diverse needs and contexts.

Among the flexible learning approaches, Home-Based Learning (H-BL) emerged as a crucial strategy that allowed students to continue their studies from home. According to Dsouza (2016), "HBL creates a learning space that extends beyond classroom walls, promoting student agency, autonomy, and discipline" [2]. Modular learning, a prominent form of H-BL in the Philippines, offered learners opportunities for self-paced study and independent engagement. However, the effectiveness of this modality hinges on the availability of high-quality instructional materials and active support from parents or guardians [3].

Despite its practicality, Home-Based Learning presents significant pedagogical challenges—particularly in the teaching of science subjects such as Physics. As Ekici (2016) noted, "Physics continues to be perceived as the most difficult subject by students due to its abstract nature, symbolic language, and reliance on mathematical modeling" [4]. These issues are exacerbated in remote learning settings where direct teacher supervision, hands-on experimentation, and conceptual scaffolding are limited. Studies have shown that concepts like projectile motion, impulse, and momentum are frequently misunderstood due to the absence of visual and contextual explanations [6], and this lack of conceptual clarity contributes to students' low performance in standardized assessments.

International benchmarks reveal these systemic weaknesses. In the 2018 PISA results, the Philippines ranked second to last out of 79 countries, with particularly low scores in science and mathematics [8]. The 2019 TIMSS results confirmed this trend, with only 13% of Filipino students reaching the low international benchmark in science [9]. These findings highlight the urgent need to improve scientific literacy through contextually appropriate and engaging instructional tools, especially for learners in the foundational years of science education.

Several recent studies have attempted to address this gap through the development of innovative learning materials. For instance, [10] developed an interactive digital story using the Twine application to teach ecosystems to elementary students, reporting increased engagement and conceptual understanding. Similarly, [2] validated a self-directed digital module in Earth Science, highlighting the importance of interactivity and learner autonomy in science instruction. However, most of these interventions are digitally oriented, and few address the challenge of offline, print-based learning experiences that remain prevalent in remote and underserved areas.

This study responds to that gap by developing and validating Home-Based Learning Activities (H-BLA) for teaching selected Physics topics to Grade 6 elementary students, grounded in Constructivist Theory, Dale's Cone of Experience, and Contextualized Teaching and Learning. The materials are aligned with the Most Essential Learning Competencies (MELCs) issued by DepEd and cover key physics topics such as: (1) generation and distribution of electricity, (2) mechanical energy, (3) the relationship among work, heat, and efficiency, and (4) impulse, projectile motion, and momentum.

What sets this study apart is its focus on print-based, hands-on instructional materials that integrate real-life applications and promote independent inquiry using locally available resources. This addresses not only curriculum requirements but also equity in access to meaningful science education for learners in technology-deprived contexts. Nevertheless, this study is limited by its focus on expert validation only. It does not include field testing with actual learners due to constraints in time and access during the post-pandemic recovery period. Future studies may explore the impact of H-BLA on student performance and motivation through experimental or quasi-experimental designs.

In summary, the novelty of this study lies in its development of a validated, culturally relevant, and print-based H-BLA material for Physics, aimed at supporting conceptual understanding in remote learning settings. By addressing both content quality and contextual appropriateness, the study contributes to current efforts in improving science instruction under the K–12 curriculum in the Philippines and provides a model for instructional design in low-resource environments.

2. RESEARCH METHOD

2.1 Research Design

This study aimed to develop and validate H-BLA, a contextualized learning material in teaching physics for elementary students. The researchers utilized a descriptive-developmental method to develop and validate H-BLA and facilitate self-directed teaching and learning in physics. The researchers used a descriptive-developmental research design suited for developing, evaluating, and refining H-BLA. The developmental approach involves a structured examination of creating, designing, and thoroughly assessing instructional programs, products, and processes that must meet specific criteria of effectiveness and internal coherence [10]. On the other hand, the descriptive method describes the present status, issues, and practices, which can be enhanced through observation, analysis, and description [11]. In this study, the descriptive method was used to analyze and interpret the data gathered from the validators and the home-based learning activities for elementary. This research design was crucial as it allowed incremental improvements of H-BLA, guided by the feedback of experts and empirical assessment.

The researchers identified the learning competencies in elementary physics for developing home-based activities. They collaboratively created and tried home-based activities that show the principles of the identified learning competencies. The researchers made a layout of learning material that meets the criteria in LRMDS. The 7Es learning model of instruction is employed to create H-BLA with interactive features, such as links, so that students can hear and watch some critical information. Furthermore, the DepEd Learning DepEd Learning Resources Management and Development System (LRMDS) tool was used as a validation tool to validate the developed H-BLA; it assessed the content quality, instructional effectiveness, and technical aspects.

2.2. Sampling Procedures and Respondents

The study utilized purposive sampling to identify five expert validators in Physics education. The panel consisted of master teachers, a principal, and an education doctoral degree holder, each with at least five years of relevant teaching experience and familiarity with MELCs. Their expertise in instructional material evaluation ensured credible and meaningful feedback.

2.3. Research Instruments

The primary instrument was the DepEd LRMDS Assessment and Evaluation Tool, which evaluates printed materials across four dimensions: content (40 points), format (72 points), presentation and organization (20 points), and accuracy and up-to-datedness of information (24 points). The tool provided both quantitative ratings and qualitative feedback to guide revisions. This framework was adapted from established validation protocols [12].

2.4. Data Collection

After developing the H-BLA materials using Microsoft Word, the researchers identified key Grade 6 Physics topics based on MELCs. The printed H-BLA and evaluation tools were distributed to expert validators upon approval, who were given five days to complete the review. The researchers then collected and analyzed the returned validation forms and written feedback.

2.5. Data Analysis

Descriptive statistics, specifically weighted mean analysis, were employed to interpret the evaluation results. Each factor was compared against its designated minimum passing score (30/40 for content, 54/72 for format, 15/20 for presentation, and 24/24 for accuracy). The use of weighted mean ensured that item-specific weights were considered to reflect the relative importance of each criterion [12].

3. RESULTS AND DISCUSSION

3.1. Development of H-BLA: Home-based learning activities (H-BLA) in teaching physics

3.1.a. Summary of the developed HBLA in Physics, highlighting the concepts and integrated features

The researchers identified the learning competencies in elementary physics inspired by the DepEd MELCs. Based on the learning competencies, the researchers developed activities that can be done at home so that students' learning will not be compromised when unexpected events occur, such as a pandemic. This learning material covers topics for the fourth quarter, as shown in Table 1.

Table 1. Developed HBLA in Physics, highlighting the concepts and integrated features

Topic and Developed HBLA	Physics Concepts	Fatures of Home-Based Learning Activities	
		Constructivist & Hands-on (Dale Cones of Experience)	Contextualized Teaching and Learning
Topic: Projectile Motion	Projectile motion is the motion of an object that is launched into the air and moves under the influence of gravity alone, following a curved, parabolic	• activity involves direct manipulation of objects (ball and bucket)	• inspired by the sport of basketball, a familiar and widely played

Take-Home Investigation-Basketball: Making Connections.	path called its trajectory. It involves two independent components of motion: a constant horizontal velocity (since there is no horizontal acceleration) and a vertical motion with constant acceleration due to gravity acting downward.	• encourages experimentation with angle and height through repeated trials • learning derived from concrete experience and physical engagement • promotes active construction of knowledge through observation and analysis • supports understanding through discovery and real-world simulation (e.g., basketball shot)	game in the Philippines • uses accessible household items (bucket and ball). • connects with common real-life scenarios like shooting hoops or throwing objects. • concepts linked to familiar motions in local sports like baseball and motocross. • aligns with learners' cultural and environmental context
Topic: Momentum *Throw the Egg*	Momentum is a vector quantity defined as the product of an object's mass and its velocity, representing the quantity of motion the object possesses. Mathematically, momentum p is expressed as: p=mv where *m* is the mass and *v* is the velocity of the object.	• hands-on activity using real objects (egg and catching surface) • students explore force, speed, mass, and direction through direct experience • learning is built from personal observation and experimentation • allows learners to construct their own understanding of impulse and momentum • connects physics concepts to everyday experiences (e.g., impact and injury prevention)	• simulates real-life scenarios such as accident and injury prevention • highlights the practical application of physics in safety measures • activity rooted in familiar, relatable situations involving motion and collision • encourages students to apply learned concepts to protect themselves and others in real-life contexts • supports localized and meaningful learning through real-world relevance
Topic: Mechanical Energy *Swing Me*	Mechanical energy is the total energy possessed by an object due to its motion and position. It is the sum of kinetic energy, which is the energy of motion, and potential energy, which is the energy stored because of an object's position relative to a force such as gravity or elasticity.	• students actively participate in the swing-based activity • demonstrates the principle of mechanical energy conservation • promotes independent learning through firsthand experience • encourages learners to construct understanding by	• uses relatable scenarios (e.g., a car on a slope) to explore energy concepts • applies potential and kinetic energy principles to everyday situations • helps students identify real-life examples of energy transformation

		observing energy changes • hands-on exploration helps students visualize the conversion between kinetic and potential energy	• highlights how energy varies depending on position (lowest and highest point) • makes abstract physics concepts tangible through familiar, local experienc
Topic: Work, Heat, and Efficiency *Turn Around*	Work- is the energy transferred when a force is applied to an object, causing it to move a certain distance in the direction of the force. Heat- is the transfer of energy between a system and its surroundings due to a temperature difference. It involves the flow of thermal energy from a hotter object to a cooler one. Efficiency- is a measure of how well a system converts input energy into useful output work or energy.	• students build a working model to demonstrate how heat can perform work • hands-on activity involves observation of heat effects (e.g., paper envelope rotation) • promotes active construction of knowledge through experimentation and inquiry • allows students to explain energy transformation through direct experience • supports comprehension of abstract thermal concepts by visualizing the process	• based on a real-life application: four-stroke combustion in heat engines • activity mirrors mechanical processes found in everyday machines • materials used are common household items, making the task accessible and relatable • bridges scientific theory with practical, familiar scenarios • integrates localized, real-world context to deepen learning and engagement
Topic: Energy: Distribution and Generation *Mini-Wind Mill*	Energy is the capacity to do work. It represents the ability of a system or object to perform work or cause change and can exist in various forms such as potential, kinetic, thermal, electrical, chemical, or nuclear energy. Energy can be transferred or transformed from one form to another, but cannot be created or destroyed, according to the law of conservation of energy.	• students build a functional mini-windmill model • learning is constructed through direct involvement in the activity • task includes clear instructions aligned with MELCs • promotes experiential learning as students apply concepts while building • hands-on engagement supports active knowledge construction and performance-based evaluation	• integrates real-world examples such as wind farms in Ilocos Norte • helps students connect classroom learning with actual applications in renewable energy • utilizes accessible materials (e.g., plastic cups, ink chambers) to complete the task • reinforces learning through familiar and localized environmental contexts • demonstrates the relevance of science in addressing real-life energy needs

3.1.b. Parts of Home-Based Learning Activities (H-BLA) in Teaching Physics.

The learning material developed was patterned according to the 7Es of DepEd in lesson planning. The following are the components of each activity in the developed H-BLA.

a.) Introductory Statement

This section provides learners a preview of the Home-Based Learning Activities (H-BLA) content. It also gives prompts for the tasks to be completed, establishes students' interests, and prepares them for the topic. The introduction captures the attention of the intended readers that will guide them to set direction for their thought process. The learners will have an idea on the topics or activities they will encounter and it can create connection to their prior knowledge [13]. In connection, the introduction in learning material such as in H-BLA has a potential to optimize students' outcome since it will be their starting point [14].

Figure 1: Sample Introductory Statement of Home-Based Learning Activities (H-BLA) in Teaching Physics.

b.) Diagnostic Assessment

Diagnostic assessment measures the learners' prior knowledge and capabilities before they perform the activities in Home-Based Learning Activities (H-BLA). It helps the learners clarify and correct their misconceptions before they begin the learning task. Pre-assessment helps the teacher to know the prior knowledge, skills, interest, and learning style of the student before the instruction begins [15]. The diagnostic assessment in H-BLA will give students information to the teacher about the prior learning on the topics. This will help the teacher to adjust the teaching strategies needed by the students.

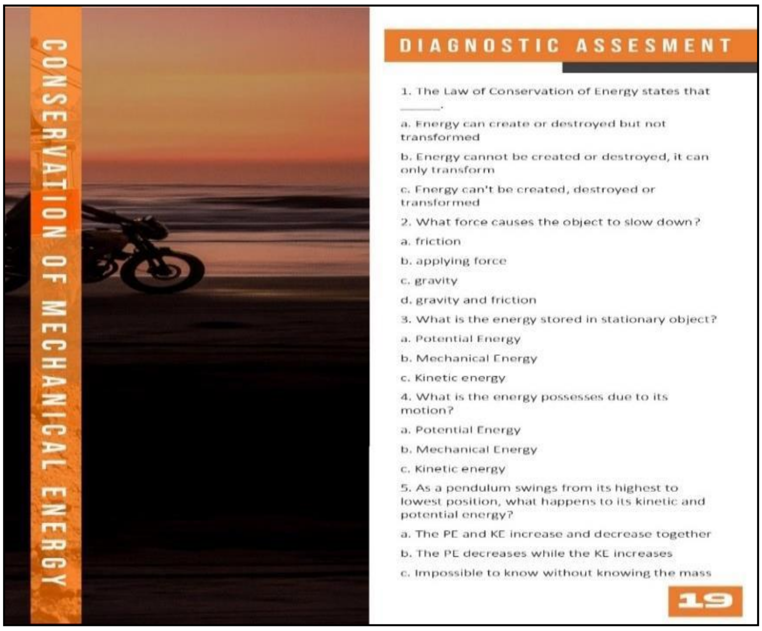

Figure 2: Sample Diagnostic Assessment of Home-Based Learning Activities (H-BLA) in Teaching Physics.

c.) Objectives

This section presents the objectives needed at the end of the discussion. It specifies what to do after completing the Home-Based Learning Activities (H-BLA). Furthermore, the objectives align and inspired from the DepEd MELCs, which learners should develop. Accordingly, learning objectives communicate to students the aim of teaching a particular topic. These objectives guide students on what they should learn and what skills and abilities they should acquire after studying the topic [16]. In terms of H-BLA, the students are guided what they will learn after completing the home-based activities particularly the conceptual understanding in physics.

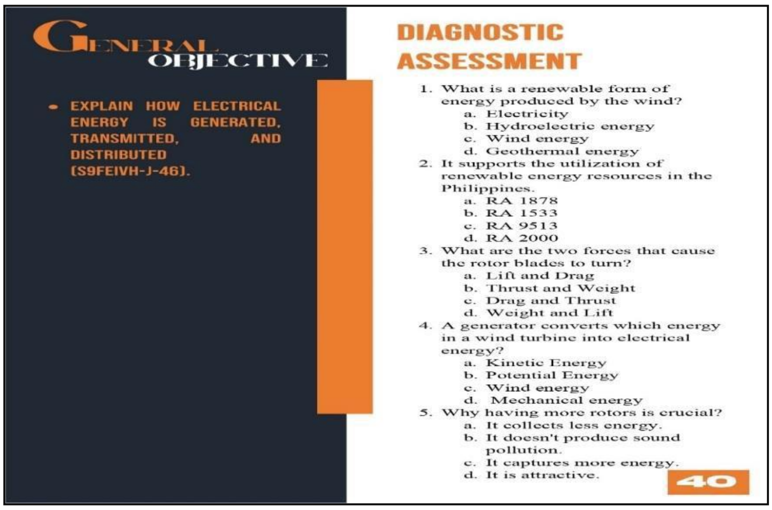

Figure 3: Sample Objectives of Home-Based Learning Activities (H-BLA) in Teaching Physics based on Learning Competencies.

d.) Learning tasks

Learning tasks plays a pivotal role in instructional setting because it will connect the students to the information they need to understand by doing the activity. It will initiate and regulate learning processes, making learning more effective and easy to understand and making an active engagement as the learners are directly involve in the tasks [17]. This part provides varied learning activities on the topics covered by the Home-Based Learning Activities (H-BLA), enabling learners to engage and develop their metacognition, skills in solving problem, and creative thinking. In other words, this is the activity proper where students acquire knowledge by conducting home-based activities.

Figure 4: Home-Based Activities.

e.) Elaborate

Elaborate gives the learners the whole discussion of the topic in the Home-Based Learning Activity. This will help students understand clearly and expand on what they have learned. Elaboration of the concept is recognized as cognitive strategy that links the new learned information with previously acquired knowledge. Through elaboration, students' understanding deepens of the subject matter and create meaningful connections [18]. In H-BLA, the elaboration consists of explanation of the concept and this learning material provides suggested videos to understand further the topic. This developed learning material provides a localized activity for a hands-on learning.

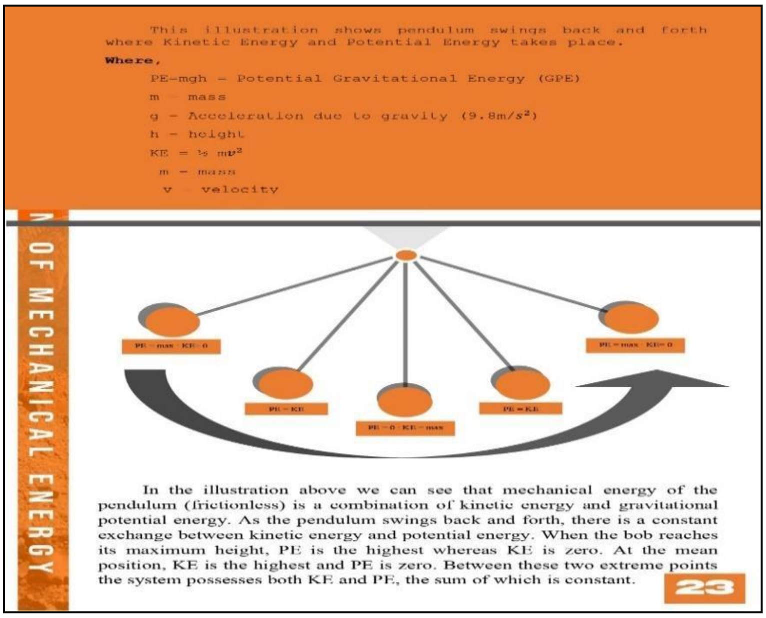

Figure 5: Sample Elaborate part of Home-Based Learning Activities (H-BLA) in Teaching Physics.

f.) Trivia

This part of the Home-Based Learning Activity is where students can broaden their science vocabulary related to the activities they participated in and learn how to apply the concepts included in a real-life scenario. Science trivia is a tool fascinating and new concepts that ignites students' enthusiasm to learn. Incorporating trivia to learning materials, students acquire knowledge while having an excitement and curiosity about it [19]. With this, incorporating trivia in H-BLA helps the retention of information to the students about a certain information that they do not know before.


EVALUATE

A projectile is an object upon which the only force is 1. __________. Gravity acts to influence the 2. __________ motion of the projectile, thus causing a 3. __________ acceleration. The horizontal motion of the projectile is the result of the tendency of any object in motion to 4. __________ in motion at constant velocity.

Due to the absence of horizontal forces, a projectile remains in motion with a 5. __________ horizontal velocity. Horizontal forces are 6. __________ required to keep a projectile moving horizontally. The only force acting upon a projectile is 7. __________ Air resistance 8. __________ the time, height and range of a projectile.

REFLECTION

What did you learn today?

What are some clarifications you want to ask?

You can visit these links for further reading and watching! Enjoy!

- https://www.youtube.com/watch?v=uVoufzwg2I0
- https://www.youtube.com/watch?v=fJCMqcOG7II
- https://www.youtube.com/watch?v=pZZt357pk-I

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Course Lumen Learning (2020). Projectile Motion. *Retrieved from https://courses.lumenlearning.com/boundless-physics/chapter/projectile-motion/#:~:text=travels%20through%20space.-,Projectile%20motion%20is%20a%20form%20of%20motion%20where%20an%20object,subject%20only%20to%20the%20gravity)*

The Physics Classroom (2021). Describing Projectiles With Numbers: (Horizontal and Vertical Velocity). *Retrieved from https://www.physicsclassroom.com/class/vectors/Lesson-2/Horizontal-and-Vertical-Components-of-Velocity*

Course Lumen Learning (2020) .Basic Equations and Parabolic Path. *Retrieved from https://courses.lumenlearning.com/boundless-physics/chapter/projectile-motion/*

Did you know?

Sports Trivia: Maximum range is achieved if the projectile is fired at an angle of 45 degrees with respect to horizontal.

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Figure 6: Sample Trivia of Home-Based Learning Activities (H-BLA) in Teaching Physics.

g.) Reflection and Suggested Learning Videos

Reflection provides students with an opportunity to gain perspective on their learning experience with Home-Based Learning Activities (H-BLA). This part of the activity allows learners to learn more about themselves and how they learn from their experiences. It also contains suggested YouTube videos that students can watch to expand their conceptual knowledge and understanding of the topics discussed in H-BLA. Reflection promotes metacognition. It helps the learners to build self-awareness, self-monitoring skills, and self-regulation as the students reflect of their learning after doing the process. Thus, they become more aware of their own thinking, strategies, learning, and areas that needs improvement [20]. Likewise, it was emphasized that incorporating videos enhances the learning experiences of the students who have special needs. In addition, videos captures curiosity, attention, and provide ways to access the information that the traditional way of teaching often struggle to explain and provide concrete examples [21].


REFLECTION

What did you learn today?

What are some clarifications you want to ask?

YOU CAN VISIT THESE LINKS FOR FURTHER READING AND WATCHING! ENJOY!

- https://youtu.be/OTK9JrKC6EY
- https://youtu.be/IqV5L66EP2E
- https://youtu.be/BcZfRSlaw7s
- https://study.com/academy/lesson/conservation-of-mechanical-energy.html

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The Physics Classroom (-) Mechanical Energy. Retrieved 02 November 2021 from https://www.physicsclassroom.com/class/energy/Lesson-1/Mechanical-Energy

CONSERVATION OF MECHANICAL ENERGY

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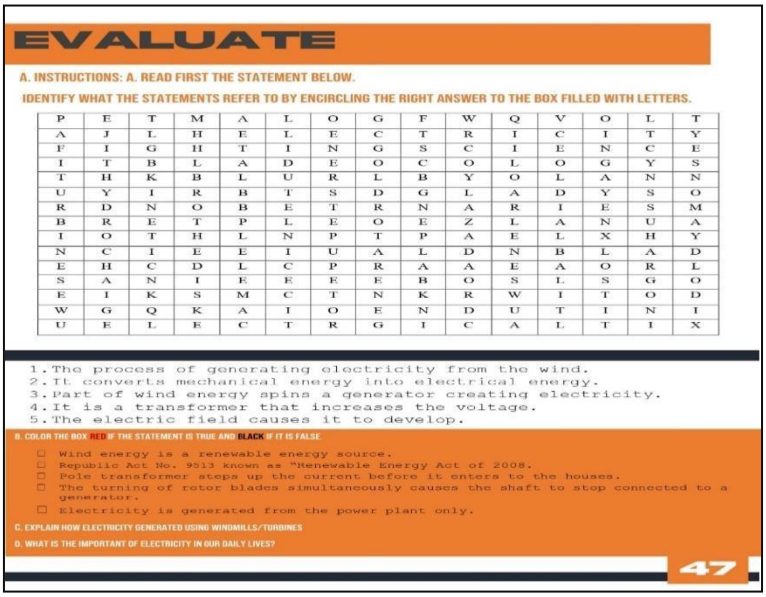
Figure 7: Sample Reflection part of Home-Based Learning Activities (H-BLA) in Teaching Physics.

i.) Evaluation

Evaluation helps students put what they have learned in H-BLA into practice. This part measures or assesses their learning after the activity. Every activity in H-BLA contains an evaluation, which is included in the last section. The students' scores will determine if objectives are met and assess H-BLA's effectiveness. Similarly, evaluation is beneficial to both students and teachers that facilitates peer-review that employs standard. Evaluation identifies the needs of the students and shows the growth of the students academically [22]. Furthermore, evaluation is a tool employed to measure the learning and progress and to improve the educational institution to improve and create fun and creative places for learning [23]. It is believed that the evaluation in H-BLA serves as a tool for the teachers and students to measure their understanding on the topic and to determine if learning objectives have been achieved



EVALUATE

A. INSTRUCTIONS: A. READ FIRST THE STATEMENT BELOW.
IDENTIFY WHAT THE STATEMENTS REFER TO BY ENCIRCLING THE RIGHT ANSWER TO THE BOX FILLED WITH LETTERS.

P	E	T	M	A	L	O	G	F	W	Q	V	O	L	T
A	J	L	H	E	L	E	C	T	R	I	C	I	T	Y
F	I	G	H	T	I	N	G	S	C	I	E	N	C	E
I	T	B	L	A	D	E	O	C	O	L	O	G	Y	S
T	H	K	B	L	U	R	L	B	Y	O	L	A	N	N
U	Y	I	R	B	T	S	D	G	L	A	D	Y	S	O
R	D	N	O	B	E	T	R	N	A	R	I	E	S	M
B	R	E	T	P	L	E	O	E	Z	L	A	N	U	A
I	O	T	H	L	N	P	T	P	A	E	L	X	H	Y
N	C	I	E	E	I	U	A	L	D	N	B	L	A	D
E	H	C	D	L	C	P	R	A	A	E	A	O	R	L
S	A	N	I	E	E	E	E	B	O	S	L	S	G	O
E	I	K	S	M	C	T	N	K	R	W	I	T	O	D
W	G	Q	K	A	I	O	E	N	D	U	T	I	N	I
U	E	L	E	C	T	R	G	I	C	A	L	T	I	X

1. The process of generating electricity from the wind.
2. It converts mechanical energy into electrical energy.
3. Part of wind energy spins a generator creating electricity.
4. It is a transformer that increases the voltage.
5. The electric field causes it to develop.

B. COLOR THE BOX RED IF THE STATEMENT IS TRUE AND BLACK IF IT IS FALSE

- ☐ Wind energy is a renewable energy source.
- ☐ Republic Act No. 9513 known as "Renewable Energy Act of 2008.
- ☐ Pole transformer steps up the current before it enters to the houses.
- ☐ The turning of rotor blades simultaneously causes the shaft to stop connected to a generator.
- ☐ Electricity is generated from the power plant only.

C. EXPLAIN HOW ELECTRICITY GENERATED USING WINDMILLS/TURBINES

D. WHAT IS THE IMPORTANT OF ELECTRICITY IN OUR DAILY LIVES?

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Figure 9: Sample Evaluation of Home-Based Learning Activities (H-BLA) in Teaching Physics.

3.2. Level of Validity of Home-based Learning Activities (H-BLA) in Teaching Elementary Physics

This section presents the level of validity of the developed Home-Based Learning Activities (H-BLA) in teaching elementary physics, based on expert evaluations using four factors: (a) content, (b) format, (c) presentation and organization, and (d) accuracy and up-to-date information.

Table 2. Factor 1: Content

Criteria	Weighted Mean	Verbal Interpretation
1. Content is suitable to the student's level of development.	3. 6	VS
2. Material contributes to the achievement of specific objectives of the subject area and grade/year level for which it is intended.	3.4	S
3. Material provides for developing higher cognitive skills such as critical thinking, creativity, learning by doing, inquiry, problem-solving, etc.	3.4	S
4. Material is free of ideological, cultural, religious, racial, and gender biases and prejudices.	3.8	VS
5. Material enhances the development of desirable the following values and traits; Scientific attitude and reasoning Desire for excellence Unity Honesty and trustworthiness	3.6	VS

Ability to know right from wrong Critical and creative thinking Productive work		
6. Material can potentially arouse the target reader's interest.	3.6	VS
7. Adequate warning/cautionary notes are provided in topics and activities concerning safety and health.	3.4	S
Total	3.54	VS

Note: VS- Very Satisfactory, S- Satisfactory

Table 2, Factor 1: Content, reveals that the Home-Based Learning Activities (H-BLA) received a total weighted mean of 3.54, interpreted as "Very Satisfactory" (VS). Most criteria scored between 3.4 and 3.8, suggesting that the content aligns well with the learners' developmental level and effectively supports both value formation and the enhancement of higher-order thinking skills. This result indicates that the H-BLA content is not only appropriate for learners' cognitive development but also promotes critical thinking, creativity, and logical reasoning. Furthermore, the instructional material demonstrates sensitivity to gender-related issues, avoiding biases and prejudices, while encouraging the development of positive traits such as scientific attitude, ethical reasoning, and social awareness. The engaging and relevant nature of the activities makes learning more enjoyable and accessible, fostering student interest and motivation. When students perceive the content as meaningful and compelling, they are more likely to participate actively, collaborate with peers, and achieve better outcomes—creating an ideal environment for enjoyable and effective learning [24].

Table 3. Factor 2: Format

Criteria	Weighted Mean	Verbal Interpretation
1. Prints		
1.1 The size of letters is appropriate to the intended user.	3.8	VS
1.2 Spaces between letters and words facilitate reading.	4.0	VS
1.3 Font is easy to read.	3.8	VS
1.4 Printing is good quality (i.e., no broken letters, even density, correct alignment, properly placed screen registration).	3.6	VS
2. Illustrations		
2.1 Simple and easily recognizable.	3.8	VS
2.2 Clarify and supplement the text.	3.8	VS
2.3 Properly labeled or captioned (if applicable).	3.8	VS
2.4 Realistic/appropriate colors.	3.8	VS
2.5 Attractive and appealing.	4.0	VS
2.6 Culturally relevant.	3.2	S
3. Design and Layout		
3.1 Attractive and pleasing to look at.	4.0	VS
3.2 Simple (i.e., does not distract the reader's attention).	3.8	VS
3.3 Adequate illustration of the text.	3.4	S
3.4 Harmonious blending of elements (e.g., illustrations and text).	3.4	S
4. Paper and Binding		

4.1 The paper used contributes to easy reading.	4.0	VS
4.2 Durable binding to withstand frequent use.	3.8	VS
5. Size and Weight of Resource		
5.1 Easy to handle.	4.0	VS
5.2 Relatively light.	3.8	VS
Total	3.76	VS

Note: VS- Very Satisfactory, S- Satisfactory

Table 3, Factor 2: Format, shows that the Home-Based Learning Activities (H-BLA) obtained a total weighted mean of 3.76, interpreted as "Very Satisfactory" (VS). All subcomponents—such as font readability, illustration relevance, and layout design—were rated either Satisfactory (S) or Very Satisfactory (VS), highlighting the material's overall strength in visual appeal and ease of use. This result suggests that the format of the H-BLA was carefully designed to support learner comprehension. The font size and style were considered readable and accessible, allowing students to easily follow and understand the text. Validators also commended the choice of illustrations and figures, which were visually appropriate and paired well with a balanced color scheme. Moreover, the printed material was evaluated as durable, lightweight, and easy to handle. These findings affirm that thoughtful formatting—including aspects such as font choice, spacing, and layout—can significantly influence students' reading experience and learning engagement. As noted in previous research, the design of text and instructional materials can affect learners' reading skills and comprehension, reinforcing the importance of format alongside content in developing effective learning tools [24][25].

Table 4. Factor 3: Presentation and Organization

Criteria	Weighted Mean	Verbal Interpretation
1. Presentation is engaging, interesting, and understandable.	3.6	VS
2. There is a logical and smooth flow of ideas.	3.2	S
3. Vocabulary level is adapted to the target reader's likely experience and level of understanding.	3.6	VS
4. The length of sentences is suited to the comprehension level of the target reader.	3.6	VS
5. Sentences and paragraph structures are varied and exciting to the target reader.	3.2	S
Total	3.4	S

Note: VS- Very Satisfactory, S- Satisfactory

Table 4 presents the findings for Factor 3: Presentation and Organization, which yielded a weighted mean of 3.4, interpreted as "Satisfactory." This indicates that the developed Home-Based Learning Activities (H-BLA) generally met the expectations for this factor. Validators found the material engaging and understandable, although some suggested improvements in sentence variety and textual flow to enhance coherence. The satisfactory rating suggests that the presentation of the material adhered to acceptable standards in terms of clarity, structure, and alignment with learning goals. According to the National Council of Teachers of English, instructional materials should be explicitly linked to educational objectives and responsive to students' needs—ensuring that activities, goals, and assessments are cohesively aligned to promote student mastery. In this context, the H-BLA was designed with clear objectives that guided the selection and sequencing of activities, thereby supporting students' progressive learning. Effective presentation also involves adherence to multimedia learning principles, such as minimizing cognitive overload and enhancing engagement through strategic layout and information design. Validators particularly appreciated the inclusion of interesting features such as trivia or fact boxes, which contributed to learner motivation. This confirms that well-organized and thoughtfully presented instructional materials can support deeper understanding and more meaningful learning experiences.

Table 5. Factor 4: Accuracy and Up-to-datedness of Information

Criteria	Weighted Mean	Verbal Interpretation
1. Conceptual errors.	3.8	VS
2. Factual errors.	3.8	VS
3. Grammatical errors.	3.6	VS
4. Computational errors.	4.0	VS
5. Obsolete information.	4.0	VS
6. Typographical and other minor errors (e.g., inappropriate or unclear illustrations, missing labels, wrong captions, etc.).	3.4	S
Total	3.76	VS

Note: VS- Very Satisfactory, S- Satisfactory

Table 5 presents the findings for Factor 4: Accuracy and Up-to-datedness, which yielded an overall weighted mean of 3.76, interpreted as "Very Satisfactory" (VS). Most criteria under this factor were rated as Very Satisfactory, although validators noted minor issues with typographical or labeling inconsistencies. The results indicate that the content of the Home-Based Learning Activities (H-BLA) features correct concepts, updated facts, and accurate information, making it a reliable instructional tool. Accurate and current content is vital in fostering learners' understanding and ensuring their exposure to relevant knowledge. As emphasized in the literature, the use of outdated instructional materials can hinder creativity, limit innovation, and impede the holistic development of learners, potentially leading to a decline in educational quality [26].

Furthermore, validators highlighted that the H-BLA presented information in a clear, concise, and age-appropriate manner. Effective instructional materials—particularly those that integrate visuals and real-world examples—enhance student comprehension by making abstract ideas more tangible and relatable [27][28]. The use of illustrations, spatial metaphors, and thoughtful color combinations not only aids memory retention but also maintains learner attention. In this context, visual elements such as background color, font style, and alignment were noted as contributing factors in improving memorization, with studies indicating a 40% difference in recall based on these design choices [29].

In addition, validators recommended enhancing the application components by incorporating more realistic and contextualized examples. When instructional content reflects real-life scenarios, students are more likely to understand and value the material, which aligns with constructivist learning theory—where learners build knowledge through connections with prior experience [30]. This real-world integration also helps correct misconceptions and supports deeper understanding. The specificity and clarity of learning objectives in the H-BLA were also commended. Well-defined objectives—those that are specific, measurable, attainable, realistic, and time-bound (SMART)—guide both teachers and students, clearly articulating what is to be learned and assessed [31], [32]. Clearly stated goals not only improve instructional alignment but also facilitate focused learning and appropriate assessment design.

Lastly, validators raised the importance of proper language use within the material. While the overall structure was commendable, areas for improvement include sentence construction, capitalization, and preposition usage. Ensuring grammatical accuracy is essential for modeling correct language use and supporting learners' writing proficiency [33], [34]. Moreover, the use of economically feasible and locally available materials was suggested to enhance accessibility, promote creativity, and accommodate learners from diverse socioeconomic backgrounds [35]. Taken together, these findings suggest that the H-BLA is a highly accurate, relevant, and thoughtfully designed instructional tool. Minor revisions in language mechanics and contextual application can further elevate its effectiveness in promoting learner engagement and understanding.

The validation results confirm that the developed H-BLA met the standards required for printed instructional materials set by DepEd. The content received strong ratings, indicating that the activities are appropriate to the cognitive level of elementary students and promote desirable traits such as critical thinking and scientific reasoning. These findings align with [24], who emphasized that instructional content must be engaging and meaningful to stimulate active participation and logical reasoning among learners.

In terms of format, the high rating reflects the user-friendly design and culturally relevant illustrations that enhance learner engagement. This supports the assertion of [25] that design features such as font readability and visual organization directly influence the usability and effectiveness of instructional materials. However, the presentation and organization received slightly lower ratings, suggesting a need for improvement in sentence variety and the logical flow of ideas. This is consistent with [33], who noted that coherence in instructional texts plays a critical role in comprehension, especially among early learners.

The high accuracy ratings demonstrate that the materials are factually sound and free from significant errors, ensuring reliability and trustworthiness. This echoes [27] and [29], who stressed that precise and current information enhances the instructional value of educational content. Lastly, validator comments highlight the importance of embedding real-life applications in each topic. This approach strengthens constructivist principles, where learners build knowledge by connecting new concepts to prior experiences [30]. Additionally, using accessible local materials promotes inclusive education and encourages creative problem-solving, as advocated by [35]. Overall, the study reinforces the potential of H-BLA in delivering quality science education, particularly under remote learning contexts. The combination of content relevance, effective formatting, accurate information, and contextualization aligns with the goals of outcome-based education and learner-centered pedagogy.

The validation results underscore the potential of the developed H-BLA as a context-responsive, learner-centered resource for elementary physics instruction, and its strengths lie not only in content alignment and factual accuracy but also in the intentional integration of real-world examples and locally available materials—elements that support constructivist and experiential learning. It is noteworthy that the presentation and organization received a relatively lower score; this observation points to opportunities for refining the structure and language to further enhance readability and coherence. Validator feedback also highlights the importance of improving grammatical precision and expanding the range of applications for varied learner contexts. These insights, along with the high ratings across most criteria, affirm that the H-BLA provides a strong foundation for promoting conceptual understanding in science while remaining inclusive, adaptable, and aligned with DepEd quality standards.

The novelty of the present study lies in its context-specific application of physics principles using locally accessible materials, bridging theoretical content with practical, home-based experimentation. Unlike other modular approaches that often rely heavily on text or online videos, the developed H-BLA incorporates real-world analogues, such as basketball to demonstrate projectile motion, or mini windmills to simulate energy generatio, , providing learners with meaningful and relatable experiences. This innovative framing not only reinforces physics concepts but also fosters students' metacognition, problem-solving skills, and environmental awareness, which are often underdeveloped in traditional instructional settings.

However, the study is not without limitations. First, the validation process focused solely on expert evaluation and did not include direct classroom or learner-based testing, which could provide further insights into usability and learning outcomes. Second, while the H-BLA was designed with localization in mind, the materials' applicability may still vary based on socioeconomic context or geographical availability of suggested materials. Finally, the current study did not incorporate a pre-post test design to measure learning gains, which limits the strength of claims about the material's direct impact on academic performance. Future research should therefore include pilot implementations among actual learners and explore longitudinal effects on conceptual understanding, retention, and student motivation in Physics.

4. CONCLUSION

This study successfully developed and validated Home-Based Learning Activities (H-BLA) in Physics for Grade 6 learners, aligned with DepEd's Most Essential Learning Competencies (MELCs). Expert validation confirmed the H-BLA's acceptability in terms of content, format, accuracy, and contextual appropriateness, highlighting its potential to support remote science instruction through hands-on, locally grounded learning.

By incorporating constructivist principles and experiential strategies, the H-BLA bridges abstract physics concepts with familiar, real-world tasks, making learning more meaningful, especially in resource-constrained settings. Its novelty lies in using culturally relevant analogues and accessible materials to foster self-directed, inquiry-based learning beyond the classroom. Despite its strengths, the study is limited by the absence of learner implementation and outcome measurement. Future research should explore the impact of H-BLA on student performance, engagement, and retention through classroom trials and pre-post assessments. Further adaptation across varying contexts may also enhance its scalability and inclusivity. Overall, the study contributes to the design of equitable and effective science instruction that meets both curricular goals and learner realities.

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