

Enhancing Grade 8 Students' Conceptual Understanding and Motivation in Ohm's Law Through the Development of ISBS Activity

Hafizah S. Pasod, Elesar V. Malicoban, Monera A. Salic-Hairulla, Vanjoreeh A. Madale, Ariel O. Ellare, Arlyn R. Alcopra

Department of Science and Mathematics Education, College of Education, Mindanao State University – Iligan Institute of Technology, Bonifacio Ave. Tibanga, Iligan City, 9200 (Philippines)

DOI: <https://dx.doi.org/10.47772/IJRISS.2025.91200145>

Received: 11 December 2025; Accepted: 19 December 2025; Published: 03 January 2026

ABSTRACT

This study sought to strengthen the instructional delivery of Ohm's Law in Grade 8 Science by undertaking a needs-based development of an Interactive Scenario-Based Simulation (ISBS) Activity. The initial phase involved systematic needs assessment among in-service Grade 8 Science teachers to determine their prevailing experiences, challenges, and instructional requirements when teaching the relationship among voltage, current, and resistance. Findings indicated persistent learner difficulties in conceptualizing electrical interactions, an overreliance on formula manipulation, and reduced engagement arising from predominantly lecture-centered instruction. Teachers further reported limited access to laboratory resources and a lack of interactive, inquiry-oriented materials capable of visualizing abstract circuit behavior.

In response to these identified needs, the ISBS Activity was developed using the 4D Model of instructional design. The resulting material integrates real-world scenarios with a dynamic, guided simulation to facilitate conceptual visualization and promote structured inquiry. The activity incorporates simplified visual representations, embedded guiding questions, and offline functionality to ensure pedagogical accessibility and contextual relevance. Through this development process, the study offers a research-informed instructional tool designed to support teachers in addressing conceptual barriers and improving the delivery of foundational electricity concepts. As this study reflects only the initial phase of material development, full classroom implementation and further refinement are recommended to maximize its instructional effectiveness.

Keywords— Scenario-based learning, PhET simulation, ohm's law, instructional materials, grade 8 science

INTRODUCTION

Physics faces persistent challenges regarding student motivation due to its inherent abstractness and perceived difficulty (Guido, 2013). This difficulty is arguably most acute in the domain of electricity, where concepts like voltage and current are invisible, forcing students to rely on mental models that are often flawed (Simeon et al., 2020). According to Cognitive Load Theory, novice learners are easily overwhelmed when they must simultaneously process complex formulas and invisible concepts without adequate scaffolding (Sweller, 2020). Consequently, students frequently treat Ohm's Law as a mere algebraic exercise, a "math-first" approach that research confirms hinders deep conceptual understanding and the ability to explain underlying physical relationships (Mboniyirivuze et al., 2019; Alqawasmi et al., 2024).

In the Philippines, these challenges are magnified by resource constraints. Recent assessments indicate that a significant majority of Filipino students fail to reach basic proficiency in science (OECD, 2023). Allan et al. (2023) noted that Filipino learners' persistent difficulties are often attributed to traditional instructional approaches, which rely on rote memorization and static explanations that fail to convey the dynamic nature of electricity. Without physical manipulatives or engaging pedagogies, "physics anxiety" becomes prevalent, threatening the country's progress in science and technology innovation (Astalini et al., 2019).

Addressing these issues requires a shift toward student-centered approaches that make abstract concepts tangible. Interactive simulations, such as PhET, enable students to visualize and manipulate complex phenomena, making it easier to see how circuit variables interact (Yildirim, 2021). Meanwhile, Scenario-Based

Learning (SBL) situates these abstract concepts within meaningful contexts, encouraging students to test and reflect on their ideas (Weng & Chien, 2022). Current literature suggests that blending scenario-based inquiries with the visual power of simulations maximizes conceptual gains (Qawasmi et al., 2024). Therefore, this study aims to develop an Interactive Scenario-Based Simulation (ISBS) Activity to enhance Grade 8 students' conceptual understanding and motivation regarding Ohm's Law, exploring whether embedding simulations within relatable narratives can effectively bridge the gap between abstract content and meaningful application.

Objectives Of the Study

This study aims to:

1. Conduct a needs assessment to identify the current experiences, challenges, and instructional needs of Grade 8 Science teachers in teaching Ohm's Law.
2. Develop an interactive scenario-based simulation activity on ohm's law

METHODS

This study utilizes a Developmental Research Design to systematically analyze, design, and develop the Interactive Scenario-Based Simulation (ISBS) activity. The process is structured around the 4D Model Approach (Define, Design, Develop, and Disseminate) to ensure the instructional material is both pedagogically sound and responsive to local needs.



Fig. 1 4D Model Stages of Development

Phase 1: Define

The primary goal of this phase is to conduct a needs assessment to identify the instructional requirements and challenges of Grade 8 Science teachers.

- Needs Assessment: A total of five (5) in-service Grade 8 Science teachers will participate to share their classroom experiences regarding the teaching of Ohm's Law ($V = IR$).
- Instrumentation: Data are gathered using a survey questionnaire adapted from Omictin et al. (2024), modified to focus on specific competencies like inferring the relationship between current, voltage, and resistance.
- Identification of Gaps: This phase identifies critical barriers, such as students' overreliance on formula memorization and the lack of interactive materials to visualize abstract electrical interactions.

Phase 2 & 3: Design and Develop

These phases focus on the actual creation and refinement of the Interactive Scenario-Based Simulation Activity.

- Design (Prototyping): Based on the "Define" findings, the researcher will design storyboards that integrate the PhET Circuit Construction Kit: DC into relatable narratives. This includes choosing a "Mystery Case" or "Foundation Day" scenario to provide contextual anchorage for the physics concepts.
- Develop (Refinement): The initial prototype will be built and subjected to expert validation. A panel of five (5) expert validators will assess the material using the DepEd Evaluation Rating Sheet for content quality, format, and accuracy.
- Iterative Revision: Revisions will be made based on validator feedback, such as converting dense text into comic-strip styles to reduce cognitive load and adding headers like "Activity 1: ENGAGE" to ensure a logical flow

- Pilot Testing: A pilot test involving 30 Grade 8 students will be conducted to identify usability issues and ensure technical functionality before full implementation.

Phase 4: Disseminate

As the study moves beyond the initial development phase, the following steps will be undertaken to ensure the material's effectiveness in a live classroom setting:

- Actual Implementation: The validated ISBS activity will be implemented with 40 Grade 8 learners to evaluate its impact on conceptual understanding and motivation.
- Impact Evaluation: A paired-sample t-test will be performed to determine if there is a significant difference between the pretest and posttest scores of the learners after exposure to the intervention.
- Scaling and Adoption: The findings and final validated activity material will be presented to the school community and science teachers to encourage the adoption of this technology-enhanced STEM instruction in other classes.

Data Gathering Procedures

Data were collected using a Needs Assessment Questionnaire adapted from Omictin et al. (2024). Prior to distribution, permissions were secured from the school administration and participating teachers. The questionnaire was administered in person, and all responses were treated with strict confidentiality. After completing the needs assessment, the researcher used the findings to design and develop the initial draft of the Interactive Scenario-Based Simulation Activity, ensuring that its features, guiding questions, circuit manipulations, and visual elements were aligned with teacher-identified needs and the Grade 8 Science competency on Ohm’s Law. Ethical standards were maintained throughout the process, including voluntary participation, anonymity of responses, and secure handling of all collected data.

Data Analysis

Data gathered from the Needs Assessment Questionnaire were analyzed using qualitative descriptive analysis. Teachers’ responses were coded and grouped into emerging themes that reflected instructional challenges, student learning difficulties, and the types of support needed when teaching Ohm’s Law. These themes directly guided the initial design of the ISBS Activity.

To ensure the quality of the developed material, validator feedback was examined by summarizing their ratings and comments, which were organized into thematic categories such as clarity of instructions, content accuracy, appropriateness of scenarios, and usability of the simulation. Insights derived from these analyses informed the refinement of the instructional material prior to its preparation for implementation.

RESULTS AND DISCUSSION

Table 1 Challenges in Teaching Ohm’s Law (V–I–R Relationship)

Theme	Code	Teacher Statements
Students’ Conceptual Difficulties	Students rely on formula memorization rather than understanding	<p>“Students can compute values when given formulas, but they cannot explain why changes in voltage affect the current” (NAS T1)</p> <p>“They memorize $V = IR$ but cannot interpret what happens when resistance increases.” (NAS T4)</p>
	Difficulty visualizing abstract electrical interactions	<p>“They cannot imagine what is happening inside the circuit; it feels too abstract.” (NAS T2)</p> <p>“Visualization of V–I–R relationship is the biggest challenge because we have no tools to show it dynamically.” (NAS T3)</p> <p>“Students struggle to connect diagrams to actual circuit behavior.” (NAS T5)</p>

Instructional Limitations	Lack of simulations or appropriate learning resources	<p><i>“We do not have concrete materials or simulations that show changes in voltage or resistance.” (NAS T2)</i></p> <p><i>“There are limited digital tools that clearly demonstrate Ohm’s Law.” (NAS T5)</i></p>
	Time constraints in covering topics	<p><i>“We often rush through electricity topics to follow the pacing guide.” (NAS T1)</i></p> <p><i>“Hands-on activities take too much time, so I end up sticking to lecture.” (NAS T4)</i></p>
Learner Engagement Issues	Students find the topic boring or difficult	<p><i>Students lose interest quickly when it’s all formulas and theory.” (NAS T3)</i></p> <p><i>“Electricity is intimidating for many students, so they disengage.” (NAS T5)</i></p>

Table 1 shows that teachers consistently identify students’ conceptual difficulties with the V–I–R relationship as the primary challenge. Respondents reported that students often rely on formula memorization (e.g., $V = IR$) without being able to explain how a change in one quantity affects the others, and they described difficulties visualizing the invisible, dynamic processes in circuits. Teachers also noted instructional constraints—limited ready-to-use simulation resources and compressed classroom time—which together push instruction toward lecture and reduce opportunities for inquiry. These practical constraints coincide with lower student engagement, as many learners find the topic abstract or intimidating.

This pattern aligns with recent investigations that document persistent misconceptions about electric circuits among secondary students and the limits of formulaic instruction. For example, Aligo et al. (2021) reported that students often form fragmented mental models of circuits when instruction relies on static diagrams and procedural problem solving rather than interactive experiences. Likewise, studies on electricity education emphasize that invisibility of electrical phenomena hinders students’ causal reasoning about current, voltage and resistance (Küçüközer et al., 2018; see also recent curriculum-focused work by Gardon et al., 2021).

Further, research on teacher-reported barriers echoes these findings: lack of appropriate instructional resources and tight curriculum pacing reduce teachers’ capacity to implement inquiry- or simulation-based lessons (Chang, 2020). Taken together, the present results underline a clear instructional need for materials that provide dynamic visualization, scaffolded inquiry, and time-efficient activities — design goals that justify developing an Interactive Scenario-Based PhET Simulation Activity to support students’ conceptual reasoning about V–I–R (Wen et al., 2020; Banda, 2022).

TABLE 2 Strategies to Address Students’ Difficulties in Understanding The V–I–R Relationship

Theme	Code	Teacher Statements
Use of Simplified Techniques	Use real-life examples and analogies	<p><i>“I use water flow analogy to show how voltage pushes the current.” (NAS T1)</i></p> <p><i>“I compare resistance to obstacles in real life so they can visualize it better.” (NAS T3)</i></p>
	Breaking formulas step-by-step	<p><i>“I guide them through solving sample problems slowly.” (NAS T4)</i></p> <p><i>“I simplify the relationship by isolating one variable at a time.” (NAS T5)</i></p>
Use of Visual Aids	Diagrams, charts, and illustrations	<p><i>“I draw simple circuit diagrams and label voltage and resistance.” (NAS T2)</i></p> <p><i>“I use prepared slides with color-coded circuits.” (NAS T3)</i></p>
Limited Inquiry-Based Attempts	Occasional hands-on demonstration	<p><i>“If materials are available, I let them observe what happens when bulbs are added or removed.” (NAS T5)</i></p>

Table 2 reveals that teachers employ a combination of simplified explanations, analogies, stepwise problem solving, and static visual aids to address students’ difficulties. Common tactics include water-flow analogies to depict current, isolating variables when solving problems, color-coded diagrams, and occasional short

demonstrations. However, hands-on and inquiry activities were described as sporadic and dependent on material availability and time.

This use of analogies and step-by-step instruction is consistent with practical classroom strategies documented in the literature; analogical reasoning supports initial conceptual bridging but tends to be a partial remedy unless paired with dynamic representations (Kautz et al., 2005; Ainsworth, 2006). Recent work indicates that analogies must be coupled with opportunities to manipulate variables (either physically or virtually) for durable conceptual change (Wen et al., 2020).

Moreover, the limited occurrence of sustained inquiry reflects constraints reported in studies of “light-weight” inquiry implementations: pragmatic, time-efficient inquiry tasks can be effective, but most classrooms need structured, low-resource designs to integrate them routinely (Chang, 2020; Nasir et al., 2022). Therefore, the teachers’ current strategies — while pedagogically reasonable — point to the need for a guided simulation that pairs analogies and worked examples with interactive manipulation and ready-made scaffolds (guided prompts, teacher notes) so that inquiry becomes feasible within usual class time (de Jong & van Joolingen, 1998; Wen et al., 2020).

TABLE 3 Current Teaching Methods Used

Theme	Code	Teacher Statements
Predominant Lecture-Based Teaching	—	<i>“Mostly lecture because it is the easiest and quickest.” (NAS T1)</i> <i>“Lecture-discussion is my main approach.” (NAS T4)</i>
Use of Multimedia	—	<i>“I sometimes use PowerPoint presentations and videos.” (NAS T3)</i> <i>“Short videos from online sources help.” (NAS T5)</i>
Limited or Occasional Simulations	—	<i>“I use PhET when the internet is stable.” (NAS T2)</i> <i>“I have tried simulations before, only when available.” (NAS T3)</i> <i>“I used PhET during a training, but not regularly.” (NAS T1)</i> <i>“I have not used any simulation in class.” (NAS T4)</i> <i>“I still rely on traditional materials because I’m unfamiliar with simulations.” (NAS T5)</i>

Table 3 shows that lecture-based delivery remains the predominant method, often supplemented by multimedia (slides, short videos) and occasional demonstrations. Use of computer simulations is inconsistent: some teachers use PhET when possible, while others have never integrated simulations into their instruction, usually because of lack of access or unfamiliarity.

This distribution reflects broader international patterns: despite recognized pedagogical value, simulation adoption in classrooms is often limited by teacher confidence, access, and curriculum pressures (Smetana & Bell, 2012; Tondeur et al., 2017). Recent reviews and meta-analyses also point out that simulations yield larger learning gains when teachers are supported by training and when simulations are embedded in guided instructional sequences (Vermunt, 2023; Wen et al., 2020). Thus, the mixed adoption seen in this study highlights two design priorities for your intervention: (1) provide a low-barrier, teacher-friendly simulation workflow and (2) embed the simulation within short, guided lesson plans so teachers can integrate it without needing large time blocks or advanced ICT skills (Otrell-Cass et al., 2011; Guo et al., 2020).

TABLE 4 Familiarity with Simulations or Scenario-Based Approaches

Theme	Code	Teacher Statements
Familiar Users Who Learned Through Training or Self-Study	Training-based exposure	<i>“I learned PhET through a seminar organized by our division.” (NAS T1)</i> <i>“I encountered simulations during an ICT training for science teachers.” (NAS T2)</i>
	Self-learning approach	<i>“I explored simulations online to help my lessons.” (NAS T3)</i>
Non-Users with Limited Exposure	—	<i>I am not familiar with using simulations.” (NAS T4)</i> <i>“I have only seen others use them but not in my own class.” (NAS T5)</i>

Table 4. indicates varied teacher pathways to familiarity: some gained experience via formal training or seminars, others via self-directed online exploration, while a portion reported no practical exposure. This heterogeneity matters because prior simulation use typically predicts stronger confidence and more successful classroom implementation.

This pattern is corroborated by empirical work showing that professional development and scaffolded learning opportunities increase teachers’ confidence and likelihood of sustained technology adoption (Ertmer & Ottenbreit-Leftwich, 2010; Guo et al., 2020). Studies of PhET and similar platforms emphasize that both structured workshops and hands-on practice are effective routes to build teacher readiness (PhET research summaries; Banda, 2022). Therefore, the mixed familiarity found here supports designing the intervention with differentiated teacher supports: a simple “quick-start” teacher guide for novices and extension notes for more experienced users.

TABLE 5 Potential Benefits of Using an Interactive Scenario-Based Simulation Activity

Theme	Code	Teacher Statements
Improved Conceptual Understanding of V–I–R	—	<p>“Students can finally see how changing resistance affects current.” (NAS T1)</p> <p>“Real-time changes in voltage will help them understand the relationship better.” (NAS T2)</p>
Increased Student Engagement	—	<p>“Simulations will make the lesson more enjoyable and interactive.” (NAS T3)</p> <p>“Students like technology-based activities, so this will motivate them more.” (NAS T5)</p>
Supports Inquiry-Based Learning	—	<p>“They can test different scenarios themselves instead of relying on my explanation.” (NAS T4)</p> <p>“The PhET simulation will allow them to experiment with values.” (NAS T2)</p>
Makes Lessons More Relatable and Real-Life	—	<p>“Real-life scenarios will help students connect theory to actual situations.” (NAS T3)</p> <p>“If the simulation shows practical situations, they will understand better.” (NAS T5)</p>

Table 5 captures teachers’ strong expectations that a scenario-based PhET simulation will deepen conceptual understanding, raise student engagement, support inquiry, and make lessons more relatable by placing V–I–R in real-life contexts. Teachers emphasized that being able to manipulate variables and observe immediate outcomes is central to these benefits.

This expectation is strongly supported by recent research: guided interaction with simulations has clear positive effects on conceptual learning and inquiry skills when tasks prompt prediction, experimentation, and reflection (Wen et al., 2020). Meta-analytic and domain-specific studies also report improved motivation and comprehension when simulations are combined with structured guidance and realistic scenarios (Rutten et al., 2012; Vermunt, 2023; Uwambajimana, 2023). Moreover, the scenario element supports contextualization, linking abstract ideas to everyday contexts, which research shows improvements transfer and student interest (Gilbert, 2006; Rutten et al., 2012). Accordingly, teachers’ perceptions in this study are evidence-based: a well-designed scenario-based PhET activity is likely to yield the conceptual and motivational gains they expect, provided it is coupled with scaffolding and teacher instructions.

TABLE 6 Additional Comments And Suggestionsy

Theme	Code	Teacher Statements
Need for User-Friendly, Guided Materials	—	<p>Please include step-by-step guidance for teachers like me who are not familiar with simulations.” (NAS T4)</p> <p>“Guiding questions per scenario would be very helpful.” (NAS T1)</p>

Need for Offline or Low-Tech Compatibility	—	<i>Our internet is unstable, so offline version is better.” (NAS T2) “If it can work without internet, it will be more useful.” (NAS T5)</i>
Visual Clarity and Simplicity	—	<i>They can test different scenarios themselves instead of relying on my explanation.” (NAS T4) “Scenario-based learning will allow them to experiment with values.” (NAS T2)</i>

Table.6 synthesizes teachers’ pragmatic recommendations: (1) provide user-friendly step-by-step guidance and guiding questions for scaffolding, (2) include offline or low-tech compatibility to accommodate unreliable internet, (3) ensure visual clarity and simplicity, and (4) anchor simulations in real-life scenarios. Teachers’ suggestions prioritize accessibility and pedagogical scaffolding over novel features — an important design cue.

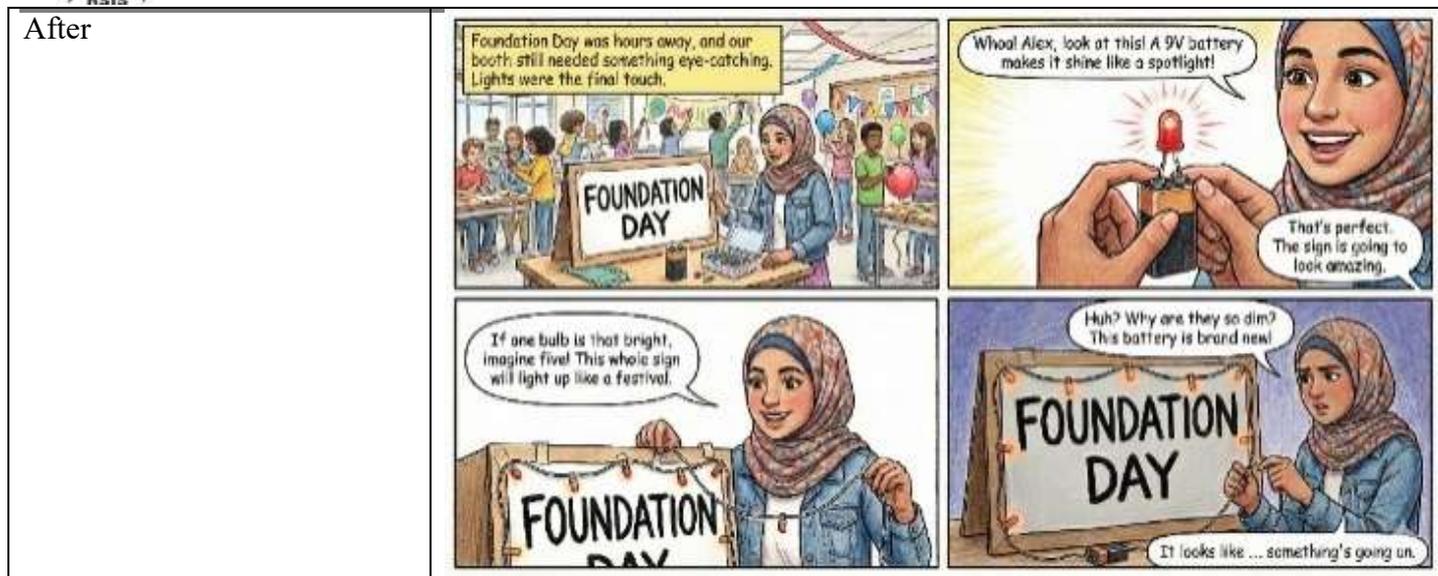
These recommendations are well aligned with contemporary best practice. Research on simulation learning underscores that unguided simulations produce mixed results, whereas guided simulations with embedded prompts and teacher supports reliably improve understanding (Clark & Feldon, 2014; Wen et al., 2020). The need for offline compatibility is echoed by studies addressing digital equity: tools that offer offline modes or printable companion activities broaden access in contexts with unstable connectivity (García-Peñalvo et al., 2021). Finally, cognitive theory of multimedia learning recommends simple, focused visuals and guided prompts to reduce cognitive load (Mayer, 2009). Taken together, teachers’ suggestions converge on a single design imperative: build a scaffolded, low-barrier, visually clear scenario-based PhET package that teachers of varying experience can adopt with minimal training.

Overall, the needs assessment reveals (a) a clear student conceptual gap about V–I–R, (b) inconsistent teacher exposure to simulation tools, and (c) pragmatic constraints (time, devices, connectivity) that limit adoption. The literature consistently shows that guided, scenario-based simulations—especially when designed for offline/low-tech contexts and accompanied by step-by-step teacher guides and embedded scaffolding—are effective ways to address these gaps (Wen et al., 2020; Banda, 2022; Vermunt, 2023; García-Peñalvo et al., 2021). Therefore, the development of an Interactive Scenario-Based PhET Simulation Activity that includes printable student worksheets, teacher quick-start guides, offline-compatible files, and guided inquiry prompts is strongly warranted by both the empirical data and current results from these conducted needs assessment.

TABLE 7 Developed Interactive Scenario-Based Simulation Activity Revisions

Revision and Comment	Text and Image
Prototype 1 First revision made to the developed ISBS activity	
Before	 <p>The image shows a PhET simulation interface. At the top, it says "DIMMING DEVICES" in large white letters on a yellow background. Below that, it says "Electricity Investigation Circuit Mystery Case". There is an illustration of a glowing lightbulb on the left and a person in a blue uniform kneeling on the right, looking at a device. At the bottom, there is a white box with the title "THE STRANGE BEHAVIOR OF APPLIANCES AT FATIMA'S HOME" and a list of instructions: 1. Look at the illustration of the living room at Fatima's house showing multiple devices plugged into one extension cord. 2. Read the scenario. 3. Think about similar situations you may have seen at home. Below the instructions, the word "Scenario:" is visible.</p>
Comments	“Add preliminary pages, (e.g. introduction to the material, learning objectives”

<p>After</p>	<div style="display: flex; justify-content: space-between;"> <div style="width: 48%;">  </div> <div style="width: 48%;">  </div> </div>
<p>Before</p>	
<p>Comments</p>	<p>“Indicate which part of the activity is this”</p>
<p>After</p>	
<p>Prototype 2 Second revision made to the developed ISBS activity</p>	
<p>Before</p>	<p>The grade 8 class recently installed a DIY charging station at the back of the room. It was built by the school’s STEM Club so students can charge their phones during free time. Everything worked fine at first—until today. During break time, several students rushed to plug in their phones. At first, everything seems normal. But after a few minutes, you and your classmates start to notice strange things: The indicator light, usually bright and steady, begins to glow faintly—almost like it’s struggling. Some students complain that their phones are charging unusually slowly. Then, suddenly, a tiny spark pops from one of the outlets. The class gasps, and your teacher walks over quickly. She immediately unplugs the station for safety.</p>
<p>Comments</p>	<p>“Opt for a comic-strip style for the scenario rather than making students read a long paragraph.”</p>



As presented in Table 7, the comments and suggestions by the panel members guided the refinement of the material. One of the key suggestions was to add preliminary pages, such as an introduction and learning objectives, to better orient the learners. In response, an engaging introduction page and a clear display of the learning competency and objectives were added to the activity. This addition aligns with the study by Flores and De Vera (2021), which highlights that well-structured learning materials with clear objectives help scaffold student engagement and comprehension.

The panel also recommended modifying the presentation of the problem scenario. Originally presented as a dense paragraph, validators suggested opting for a comic-strip style to reduce reading load and increase appeal. In response, the text-heavy description was replaced with a visually engaging comic strip depicting a relatable school event ("Foundation Day"). This modification is supported by Rogayan and Dollete (2019), who found that using localized stories and visual narratives, such as comics, in Strategic Intervention Materials significantly improved Filipino students' mastery of science concepts by making abstract ideas more accessible. Furthermore, Mayer's Cognitive Theory of Multimedia Learning (2014) suggests that combining visual representations with verbal information—"dual-coding"—aids retention and reduces cognitive load, justifying the shift from pure text to a graphic narrative.

The second revision addressed the panel's recommendation to improve the structural organization of the material. Validators noted the need to clearly indicate which part of the activity specific sections belonged to. Consequently, headers such as "Activity 1: ENGAGE" were added to explicitly label the phases of the lesson. This ensures a logical flow of ideas, which the validation results confirmed contributes to a "smooth flow of ideas" that allows students to follow the steps easily.

Additionally, the panel suggested refining the text layout of the scenarios to improve readability. This adjustment responds to the validators' feedback on text density and layout balance. By simplifying the visual presentation, the material reduces extraneous cognitive load, allowing students to focus on the intrinsic load of the physics concepts, a principle supported by Sweller's Cognitive Load Theory (2011). This change also aligns with findings by Villanueva and Torres (2021), who emphasized that well-organized visuals and proper spacing are critical for effective instructional materials for Filipino learners.

TABLE 8 Summary of the Evaluation Results for the Developed Scenario-Based Simulation Activity

Factors	Mean Rating	Mean Score	Description
A. Content	3.80	26.6	Very Satisfactory
B. Format	3.74	67.3	Very Satisfactory
C. Presentation & Organization	3.76	18.8	Very Satisfactory
D. Accuracy and Up-to-datedness of Information	3.87	23.2	Very Satisfactory
Overall Mean	3.79	136	Very Satisfactory

Table 8 presents the summary of the evaluation results for the developed Scenario-Based Simulation Activity on Ohm's Law, as assessed by five (5) in-service science teachers using the DepEd Evaluation Rating Sheet for Printed Materials (2015). This rubric evaluates instructional materials across four major factors: Content Quality, Format Quality, Presentation and Organization, and Accuracy and Up-to-Datedness of Information.

Results indicate that all four criteria obtained mean rating ranging from 3.74 to 3.87, which fall within the Very Satisfactory (VS) range. This confirms that the developed material meets, and in several areas exceeds, DepEd standards for instructional resource quality.

Content Quality

The Content factor obtained a weighted mean of 3.80 and a total score of 26.6, which significantly exceeds the passing threshold of 21 points. This Very Satisfactory rating demonstrates that the scenario-based simulation activity is highly aligned with the developmental characteristics of Grade 8 learners and effectively supports the learning competencies related to Ohm's Law. Validators indicated that the material contributes to achieving subject objectives, promotes inquiry-based tasks, and integrates important scientific values such as critical thinking, scientific reasoning, and the desire to learn new things.

However, validators noted that the activity could further enhance its ability to arouse student interest by revising dense text sections and adding more interactive guiding questions. Despite this, the overall content structure clearly supports conceptual development, which is essential in addressing misconceptions in electricity. This finding is consistent with recent research emphasizing that contextualized and inquiry-based materials significantly improve students' conceptual understanding in physics (Reyes & Bautista, 2021; Tan & David, 2022).

Format Quality

The Format factor obtained a mean of 3.74 with a total score of 67.3, surpassing the required passing score of 54 points. This Very Satisfactory interpretation suggests that the material demonstrates strong visual and structural design in terms of font readability, use of illustrations, page layout, and overall physical aesthetic.

Validators particularly highlighted that the illustrations are realistic and appropriate, the text is clear, and the resource is easy to handle. Some indicators, such as spacing and layout balance, received slightly lower scores, pointing to opportunities for refinement—specifically in improving white space and ensuring consistent captioning. This aligns with studies emphasizing the importance of well-organized visuals in reducing cognitive load (Villanueva & Torres, 2021; Flores & De Vera, 2021).

Presentation and Organization

The Presentation and Organization factor achieved a mean of 3.76 and a total score of 18.8 (Passing Score: 15). The Very Satisfactory rating confirms that the material is engaging, logical in sequence, and appropriate for the target reading level. Validators agreed that the smooth flow of ideas ensures that students can follow the scenario and simulation steps easily.

The results suggest that the material effectively scaffolds student engagement through relatable scenarios and clear task instructions. These findings reiterate the principle that well-structured learning materials enhance motivation and comprehension, particularly when aligned with the cognitive readiness of students (Wang & Kurniawan, 2020; Acosta, 2020).

Accuracy and Up-to-Datedness of Information

Accuracy and Up-to-Datedness obtained the highest mean of 3.87 with a total score of 23.2. While this falls under the Very Satisfactory category, the score indicates the presence of minor typographical or labeling concerns during the initial evaluation (preventing a perfect score of 24). However, these identified errors were corrected in the final revision to ensure the material meets the strict accuracy standards required for physics instruction. This result confirms that the final output is free from major conceptual, factual, or computational errors.

This result strengthens the validity of the material as an accurate resource for teaching Ohm's Law, meeting the crucial standards for simulation-supported learning (Guzman & Ortega, 2020).

The Overall Mean of 3.79 and a Grand Total Score of 136 place the developed Scenario-Based Simulation Activity under the Very Satisfactory category. Furthermore, the data confirms that the material met the passing score requirements across all four LRMDs factors. This indicates that the material is pedagogically sound, logically presented, accurate, and ready for classroom implementation.

The validators' scores confirm that the material is suitable for addressing conceptual difficulties in Ohm's Law through scenario-based inquiry. Hence, the material demonstrates strong potential to enhance the conceptual understanding, motivation, and inquiry skills of Grade 8 learners, especially when integrated into a well-structured 5E instructional sequence.

CONCLUSIONS

The version of this template is V2.

ACKNOWLEDGMENT

The heading of the Acknowledgment section and the References section must not be numbered.

REFERENCES

1. Aronoff, S., (1989). Geographic Information Systems: A Management Perspective. Ottawa: WDL Publications.