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Electronic Multimodel-based Instructional Materials Development on the Sound Wave Topic Incorporating the Verses of the Quran

Muhammad Choirul Hadi Santoso*, Zainuddin, and Mastuang
Physics Education Study Program, Teacher Training and Education Faculty
Universitas Lambung Mangkurat, Banjarmasin Indonesia
sm.choirulhadi@gmail.com

Abstract

This research aims to produce multimodel-based electronic instructional materials on sound waves incorporating the verses of the Quran to improve learning outcomes. This research aims to describe the validity, practicality, and effectiveness of the instructional materials. The method employed was research and development. The model of research and development used was the ADDIE model. The pre-experiment design (the one-group pretest-posttest design) was conducted. The subjects of the tryout test consisted of 33 students of XI MIPA 4 MAN 2 Banjarmasin. The data were collected through validity assessment instruments, questionnaires, and learning achievement tests. The results of the research showed that: (1) the lesson plan validity of 3,44 is very good; the validity of the student worksheet of 3.27 category is good; the validity of the instructional material of 3.30 was good; and the validity of achievement test of 3.33 was good, (2) the practicality of the instructional materials with an average score of 3.33 was a good category, and (3) the effectiveness of instructional materials with an average score of 0.75 was a high category. It can be concluded that multimodel-based electronic instructional materials on sound waves incorporating the verses of the Quran are applicable in learning. Thus, the instructional materials developed can be used as alternative materials to improve learning outcomes.

Keywords: Electronic Instructional Materials; Multimodels; Sound Waves; Verses of The Quran

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INTRODUCTION

The study of physics theory has been explained in Quran, and the verses of the Quran can be proven using physics theory. Physics is a discipline that contributes to the advancement of science and technology. This is reflected in the development of physics learning that has been repeatedly applied (Keller et al., 2017; Mardayani et al., 2013; Peng et al., 2018). Physics learning must be supported by the availability of instructional materials in the form of media so that students can easily

comprehend the lesson. Relevant and engaging instructional materials are required to optimize learning. Students can easily comprehend physics lessons when the learning resources are rich in simulations, videos, and images (Hartini et al., 2017; Wahyuni et al., 2019; Zainuddin et al., 2019). The electronic instructional materials include electronic features such as video, interactive media, and audio. She also explained that instructional materials containing verses of the Quran are related to the content and verses of the Quran (Mastuang et al., 2019; Wahyuni et al., 2019; Wati et al., 2020).

The preliminary research employing the interview method at MAN 2 Banjarmasin with one of the Physics teachers showed that there are currently no instructional materials that include spiritual aspects of religion, such as the verses of the Quran. In addition, learning has not been explicitly linked to the religious aspects of students, and the instructional materials have no connection to the verses of the Quran. During the interview, it was stated that physics education related to Islam's spiritual aspects is essential, particularly at MAN 2 Banjarmasin, since it is affiliated with the Ministry of Religion, which requires the school to uphold Islamic religious values. Moreover, it is found that the students find it difficult to comprehend the physics material, and less than fifty percent of the physics problem-solving tests are not solved correctly and well. This can be due to the learning models that do not follow the syntax. According to the MAN 2 Banjarmasin physics teachers, physics material necessitates a solid grasp of concepts. Therefore, most physics material is taught in class using a direct instruction model that emphasizes the teacher as the information provider. However, the instructional materials used thus far have not adequately aided students and teachers in the learning process. This results in a lack of comprehension among some students and poor learning outcomes.

A multimodel is a learning process that employs more than two or several models (Imron, 2021; Maria, 2010; Nida et al., 2021). Therefore, multiple learning models are utilized to teach physics lessons. Direct instruction, cooperative learning, and generative learning are the models used. Each of the three preceding models has its advantages. The direct instruction has advantages because it is explicitly effective for teaching concepts and boosting low student achievement (Arifuddin et al., 2021; Majid, 2013; Stockard et al., 2018). According to Depdiknas in Taniredja (2011), the cooperative learning model has an advantage in enhancing academic outcomes through group projects to meet learning objectives. In addition, this model is an appropriate strategy for enhancing students' learning outcomes and social skills (Muhammad et al., 2021; Supena et al., 2021; Zainuddin et al., 2017). The generative learning model can motivate students to articulate their ideas and opinions actively. This model employs the prior knowledge of students, which is then actively integrated (Harum et al., 2017; Irwandani, 2015). The learning models chosen to teach the topic of sound waves are direct instruction (DI), generative learning, and cooperative learning based on the characteristics of the materials to be taught and the characteristics of the students. By applying these three models, students' comprehension and learning outcomes will be enhanced.

Implementing multimodels in previous studies improved student learning outcomes and the effectiveness of instructional materials by incorporating the verses of the Quran. According to Fautin et al. (2021), multimodel learning improves learning outcomes. Nurhafizah et al. (2015) and Zainuddin et al. (2020) research demonstrates the feasibility of a physics module based on the interrelation between the Quran and science, as

indicated by a module categorized as quite effective. In addition, the research findings of Nida et al. (2021) indicate that multimodel-based electronic instructional materials tested with a student-oriented response questionnaire are practical. Consequently, electronic instructional materials can train students' analytical skills using multiple models.

The difference between the products developed in this study from previous products is the use of the model, namely direct teaching, cooperative learning, and generative learning. The development of instructional materials in electronic instructional materials on high school physics material, specifically sounds waves carrying the verses of the Quran, supported by the presentation of flipbooks, videos, and hyperlinks to facilitate comprehension.

Competency analysis has been passed to maximize students' academic achievement through multimodel learning using electronic instructional materials incorporating Quran verses, analysis of student characteristics, and characteristics of sound waves material. Incorporating Quran verses into the electronic instructional materials assisted with Flipbook will contribute to the novelty of the developed instructional materials. This research assesses the feasibility of electronic instructional materials developed for high school physics lessons, namely sound waves incorporating the verses of the Quran. The specific objective of this research is to describe the validity, practicality, and effectiveness of multimodel-based electronic instructional materials on the topic of sound waves incorporating Quran verses.

METHOD

Research and Development (R&D) was the type of research employed. This study employed the ADDIE model, which consisted of five stages for developing the intended product. The stages of the development procedure consisted of analysis, design, development, implementation, and evaluation (Tegeh et al., 2014).

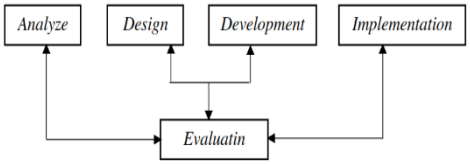


Figure 1 ADDIE Design

Basic competency analysis, character analysis of students, and characteristics analysis of instructional materials are conducted during the analysis stage. At the design stage, learning activities and assessment instruments are designed. During the development stage, developing and validating electronic instructional materials are performed. The instructional materials were tested on XI MIPA 4 MAN 2 Banjarmasin students during the implementation stage. The use of electronic instructional materials was evaluated, and their feasibility based on their validity, practicability, and effectiveness were calculated during the evaluation stage.

This research was conducted in May to the samples of this research, namely the students of XI MIPA 4 MAN 2 Banjarmasin academic year 2021-2022. The purpose of this research is to determine the feasibility of multimodel-based electronic instructional materials on the topic of sound waves, incorporating Quran verses. In this research, the researcher acted as the teacher. The data were collected by assessing the instructional materials' validity, response questionnaires, and learning outcomes tests in the form of cognitive abilities.

Two physics academics and a physics learning practitioner validated electronic instructional materials. The results of the validity assessment are determined using the average overall score on the evaluation aspect factors, as adjusted for the evaluation classification, as shown in Table 1.

Table 1 The criteria of validity

Average Score	Category
$\bar{x} > 3.4$	Very good
$2.8 < \bar{x} \leq 3.4$	Good
$2.2 < \bar{x} \leq 2.8$	Fair
$1.6 < \bar{x} \leq 2.2$	Less good
$\bar{x} \leq 1{,}6$	Not good

(Adapted from Widoyoko (2017))

The reliability of the validation results was analyzed using the Cronbach Alpha equation, which met the reliability criteria.

Table 2 The criteria of reliability

Reliability Coefficient	Reliability Category
$0.80 \leq r \leq 1.00$	Very high
$0.60 \leq r < 0.80$	High
$0.40 \leq r < 0.60$	Fair
$0.20 \leq r < 0.40$	Low
$0.00 \leq r < 0.20$	Very low

(Adapted from Arikunto (2013))

The practicality of the instructional materials based on the student response questionnaire was analyzed by calculating the average score. The result fulfilled the practicality standards as adjusted in Table 3.

Table 3 The criteria of practicality

Interval	Category
$\bar{\boldsymbol{x}} > 3.4$	Very good
$2.8 < \bar{\boldsymbol{x}} \leq 3.4$	Good
$2.2 < \bar{\boldsymbol{x}} \leq 2.8$	Fair
$1.6 < \bar{\boldsymbol{x}} \leq 2.2$	Less good

(Widoyoko (2017))

The effectiveness of the instructional materials was examined based on the students' pretest and posttest scores. The N-Gain score determines the degree of improvement in students' learning outcomes. The result of the N-Gain score is shown in Table 4.

Table 4 The category of N-Gain score

Interval	Category
$(\langle \boldsymbol{g} \rangle) \geq 0{,}7$	High
$0{,}7 > (\langle \boldsymbol{g} \rangle) \geq 0{,}3$	Medium
$(\langle \boldsymbol{g} \rangle) < 0{,}3$	Low

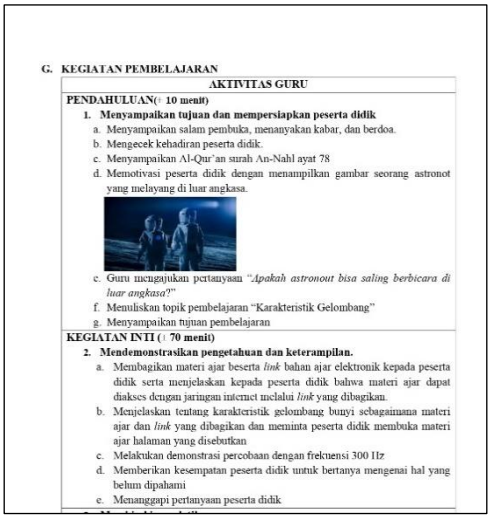
Hake (1998)

RESULT AND DISCUSSION

The research that has been conducted is the research and development of electronic instructional materials using multimodel learning for SMA/MA/equivalent levels on sound wave material incorporating the verses of the Quran. The instructional materials included lesson plans, student worksheets, instructional materials, and achievement tests developed by researchers who assessed the feasibility of instructional materials.

The use of models, namely direct teaching, cooperative learning, and generative learning, distinguishes and distinguishes research-based products from their predecessors in terms of originality and difference. The product developed is an electronic instructional material for sound wave material incorporating Quran verses, supported by a presentation in flipbooks, videos, and hyperlinks to facilitate comprehension.

The lesson plans on sound waves with Quran verses were created using a multimodel of direct instruction, cooperative learning, and generative learning based on the 2013 Curriculum. The validated lesson plans evaluated the lesson plan's format, language use, and content. Figure 2 depicts the appearance of the developed lesson plan, while Table 5 lists the results of the lesson plan validation.



G. KEGIATAN PEMBELAJARAN

AKTIVITAS GURU
PENDAHULUAN(± 10 menit)
1. Menyampaikan tujuan dan mempersiapkan peserta didik
a. Menyampaikan salam pembuka, menanyakan kabar, dan berdoa.
b. Mengecek kehadiran peserta didik.
c. Menyampaikan Al-Qur'an surah An-Nahl ayat 78
d. Memotivasi peserta didik dengan menampilkan gambar seorang astronot yang melayang di luar angkasa.
e. Guru mengajukan pertanyaan *"Apakah astronout bisa saling berbicara di luar angkasa?"*
f. Menuliskan topik pembelajaran "Karakteristik Gelombang"
g. Menyampaikan tujuan pembelajaran
KEGIATAN INTI (± 70 menit)
2. Mendemonstrasikan pengetahuan dan keterampilan.
a. Membagikan materi ajar beserta *link* bahan ajar elektronik kepada peserta didik serta menjelaskan kepada peserta didik bahwa materi ajar dapat diakses dengan jaringan internet melalui *link* yang dibagikan.
b. Menjelaskan tentang karakteristik gelombang bunyi sebagaimana materi ajar dan *link* yang dibagikan dan meminta peserta didik membuka materi ajar halaman yang disebutkan
c. Melakukan demonstrasi percobaan dengan frekuensi 300 Hz
d. Memberikan kesempatan peserta didik untuk bertanya mengenai hal yang belum dipahami
e. Menanggapi pertanyaan peserta didik

Figure 2 Lesson plan

Table 5 The Lesson Plan Validity

Assessment Aspect	Validity	
	Score	Category
Lesson plan format	3.55	Very good
Language use	3.40	Very good
Content	3.40	Very good
Average score	3.44	Very good
Reliability	0.93	Very high

The format of the lesson plan was classified as very good. The following criteria have been met in the lesson plan format: appropriateness of the lesson plan format, inclusion of learning objectives, concise material, learning syntax, tools, materials, learning media, clarity of numbering, precise layout, and balance of the lesson plan writing's content. The lesson plan format was presented in accordance with Permendikbud No. 22/2016, which directs the creation of 2013 curriculum-aligned lesson plans.

The language used in the lesson plans has been deemed to be very good. The use of language conforms to Indonesian grammar, employs easily-understood words, provides instructions that do not lead to multiple interpretations, and serves as a reference. Lesson plans containing comprehensible language can be utilized during learning activities (Daryanto & Dwicahyono, 2014). The acquisition of the language aspect used in the lesson plans demonstrates that they possess the qualities of a good lesson plan and can be utilized.

The content of the lesson plan has been categorized as very good. The important components of the lesson plan's content are as follows: writing core competencies, writing basic competencies, the accuracy of the translation of basic competencies to indicators, the accuracy of the translation of indicators to learning objectives, and containing syntax in accordance with the models used during learning. The objectives and learning activities in the lesson plan reflect the relationship between the basic competencies and the indicators, followed by the objectives, until the learning activities are conducted in accordance with the 2013 curriculum (Yunus et al., 2018). The lesson plan contains supporting devices such as media and learning resources. Supporting devices take the form of media that serves as an instrument to convey the material being taught (Rusman, 2017). In addition, the lesson plan's time allocation is reasonable. The typical time allocation for high school learning activities is two 45-minute face-to-face instruction sessions, considering the number of meetings mandated by the 2013 curriculum (Rusman, 2017). The acquisition of the highly valid content aspect of the lesson plan demonstrates that the lesson plan has the qualities of an effective lesson plan and can be used.

The overall validity results for the lesson plan have a very good category with a very high level of reliability. The assessment of the lesson plan by the three validators does not differ substantially, indicating that there are many similarities in almost all aspects of the assessment. Therefore, the assessment can be considered reliable, and the lesson plan is appropriate for use as a guide for teaching in a classroom where the learning process conforms to the specified learning strategy.

The student worksheet was made for every meeting; the first and second meetings involved the worksheet experiments (Suyanto et al., 2009), and the third meeting involved the worksheet based on the analysis of the experimental results. The following components made up the worksheet: (1) the title; (2) the identity column; (3) the objective; (4) the formulation of the problem; (5) the formulation of the hypothesis; (6) the tools and materials; (7) the identification; (8) the operational definition of the variables; (8) the procedure; (9) the observation results; (10) the data analysis; and (12) the conclusion. The design, the format, the language use, and the content of the worksheet are the four

assessment factors used to create the worksheet validation instrument. Figure 3 shows the worksheet display, and Table 6 shows the findings of the worksheet validation.

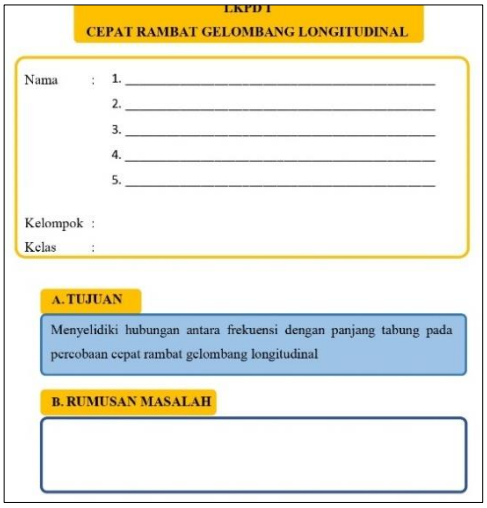


Figure 3 Students worksheet

Table 6 Students Worksheet Validity

Assessment Aspect	Validity	
	Score	Category
Worksheet design	3.16	Good
Worksheet format	3.33	Good
Language use	3.41	Very good
Content	3.19	Good
Validity	3.27	Very good
Reliability	**0.84**	**Very high**

The design aspect of the worksheet in the category of 'good' demonstrates that the worksheet is structured with a sequence of practicum activities that adhere to scientific procedures, such as objectives, problem formulation, tools and materials, experimental procedures, data analysis, and conclusions. This is in line with Suyanto et al., (2009) in which the worksheet is provided with laboratory activities (scientific procedures).

The format of the worksheet is categorized as good. This demonstrates that the worksheet employs language that students can comprehend. Making the worksheet involved the formulation of indicators, the formulation of objectives, the numbering system, the type and size of letters, the suitability of layout, the balance of text and illustrations, the presence of activity procedures, and an adequate answer sheet with answer keys. The preceding explanation is consistent with Prastowo's (2015) assertion that the worksheet is attractive and simple to read to facilitate comprehension of the activity procedures.

The results of validation based on language use are categorized as very good. This worksheet is written using simple language in accordance with Indonesian grammar. The sentences used are at the level of student thought and do not contain phrases susceptible to multiple interpretations. One of the requirements for preparing worksheets is the construction requirement, which stipulates that it must use language appropriate to the maturity level of students, have a clear sentence structure, and be able to illustrate activities with appropriate sentences (Yunus et al., 2018).

The content aspect of the worksheet is categorized as good. The worksheet's content includes conformity with the 2013 curriculum, relevance to the model phase used, well-organized filling procedures, correspondence between the questions and lesson plan objectives, image illustrations to clarify concepts, and problem-solving steps in the worksheet. This refers to the worksheet content statement that must align with learning objectives (Prastowo, 2015). Hence, the worksheet with the development that has been made can facilitate improving student learning outcomes.

The results of the validation of the worksheet developed are categorized as good, and the degree of reliability calculated indicates a very high degree. This indicates that the evaluations by the three validators are comparable, meaning that this worksheet is reliable. The results of the worksheet development apply to teaching and learning activities that aim to enhance student learning outcomes. The worksheet is consistent with Astuti & Setiawan (2013), which includes the

title, learning instructions, desired competencies or indicators, supporting information, material instruments, tasks and work procedures, and evaluation. The worksheet component is interactive, and inspiring and encourages active participation, providing ample space for students' talents, interests, physical development, psychological growth, independence, and creativity. The worksheet development aims to generate an engaging and beneficial learning environment.

The validation of instructional materials was performed by three validators using an assessment comprised of four factors: format, language use, content, and presentation of the instructional materials. Figure 4 depicts the appearance of the instructional materials, while Table 7 demonstrates that the overall validity and reliability of the instructional materials developed are rated as good. Each assessment criterion's justification is explained in the following section.

Figure 4 Instructional materials

Table 7 The validity of instructional material

Assessment Aspect	Validity	
	Score	Category
Instructional material format	3,22	Good
Language use	3,29	Good
Content	3,15	Good
Presentation	3,46	Very good
Validity	3,30	Good
Reliability	**0,98**	**Very high**

The format aspect of the instructional materials is determined to be in a good category, indicating that the applied and developed instructional materials are attractively arranged and have a good display. The criteria consist of the cover, font size, legibility of numbering, appropriate layout, a summary of the material, suitability of the size used, suitability of the material to the development of students, and suitability to the level of students' social and emotional development. This is consistent with what Prastowo (2015) revealed that the form of good instructional materials must include characteristics such as an attractive design, an understandable content sequence, a concise title, a clear cognitive structure, clear material elements, suitable instructional materials, and simple language to comprehend (letters are not too small).

The language aspect is categorized as good, indicating that the development of the instructional materials adheres to proper Indonesian grammar. Communication, dialogic and interaction, directness, coherence, the order in the flow of thought, and consistency are the language criteria used to determine validity in accordance with Indonesian grammar. According to Yunianti & Wahyudi (2014) the characteristics of good instructional materials are made visually accessible.

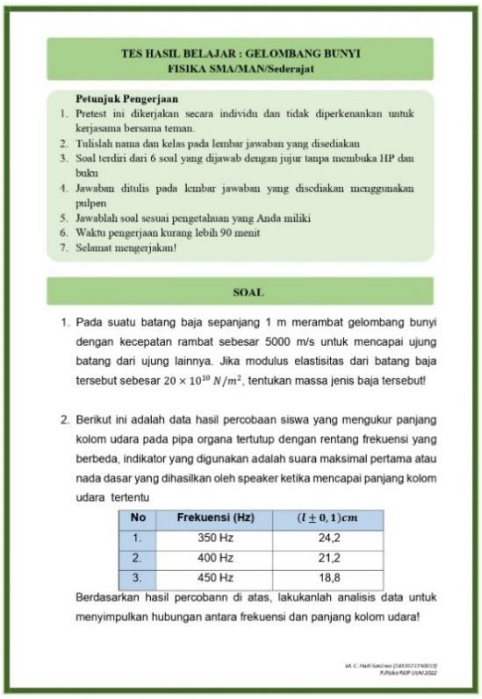
The evaluation of the content aspect of the material to be taught is categorized

as good, in which the development of instructional materials in accordance with the desirable basic competencies. The criteria for the validity of instructional materials include the accuracy of the contained material, the currency of science and features, and the breadth of the contained material. According to BSNP (2008), the content component requires that the instructional material must refer to the student learning outcomes, namely basic competencies. This component can be evaluated based on the material's completeness, depth, and breadth. In accordance with the Republic of Indonesia's government regulation number 57 of 2021 about national education standards regarding content standards, namely the scope of material according to the level of education, the content of the material is the lesson delivered in learning and contains scientific concepts.

The presentation aspect of the instructional material is rated as very good, indicating that it can stimulate students' minds because the concept of the material used is present in the surrounding environment and has been experienced by students, causing feedback and arousing their curiosity. The presentation aspect's validity relates to the presentation technique and supporting material presentation. Students must be connected to the internet to access the final product, a flipbook created with the software Flip PDF Professional. It is in accordance with Situmorang's (2013) explanation that the presentation of good instructional materials must stimulate students' thinking process because the concept of the material used is related to the student's experience so that cooperative skills and student independence can develop.

Due to the fact that the average score for all aspects is rated as good, it can be concluded that the developed instructional materials are suitable for use in learning, albeit with revisions. In accordance with the 2016 Permendikbud, these outcomes meet the requirements for high-quality instructional materials. This highly reliable instructional material indicates that the value difference is not significantly different from the validator's evaluation, and there are also many similarities in each aspect of the assessment. Thus, instructional materials can be utilized online or offline in the classroom.

The achievement test developed by the researcher includes instructions for completing the questions and six items representing each learning objective in essay form. The question with very good validity is question number 3; the correct question types are questions 1, 2, 4, 5 and 6. Developmental achievement test contains questions, instructions, and scores corresponding to the question's cognitive level. The achievement test is also designed using Indonesian grammar properly to facilitate students' comprehension. Figure 5 depicts the achievement test interface, and Table 8 displays the achievement test validation results.



TES HASIL BELAJAR : GELOMBANG BUNYI
FISIKA SMA/MAN/Sederajat

Petunjuk Pengerjaan

1. Pretest ini dikerjakan secara individu dan tidak diperkenankan untuk kerjasama bersama teman.
2. Tulislah nama dan kelas pada lembar jawaban yang disediakan
3. Soal terdiri dari 6 soal yang dijawab dengan jujur tanpa membuka HP dan buku
4. Jawaban ditulis pada lembar jawaban yang disediakan menggunakan pulpen
5. Jawablah soal sesuai pengetahuan yang Anda miliki
6. Waktu pengerjaan kurang lebih 90 menit
7. Selamat mengerjakan!

SOAL

1. Pada suatu batang baja sepanjang 1 m merambat gelombang bunyi dengan kecepatan rambat sebesar 5000 m/s untuk mencapai ujung batang dari ujung lainnya. Jika modulus elastisitas dari batang baja tersebut sebesar $20 \times 10^{10}\ N/m^2$, tentukan massa jenis baja tersebut!

2. Berikut ini adalah data hasil percobaan siswa yang mengukur panjang kolom udara pada pipa organa tertutup dengan rentang frekuensi yang berbeda, indikator yang digunakan adalah suara maksimal pertama atau nada dasar yang dihasilkan oleh speaker ketika mencapai panjang kolom udara tertentu

No	Frekuensi (Hz)	$(l \pm 0,1)cm$
1.	350 Hz	24,2
2.	400 Hz	21,2
3.	450 Hz	18,8

Berdasarkan hasil percobann di atas, lakukanlah analisis data untuk menyimpulkan hubungan antara frekuensi dan panjang kolom udara!

Figure 5 Learning achievement test

Table 8 The validity of learning achievement test

No.	Assessment Aspect	Validity	
		Score	Category
1	General construction	3.38	Good
	Language use	3.16	Good
2	General construction	3.33	Good
	Language use	3.50	Very good
3	General construction	3.44	Very good
	Language use	3.50	Very good
4	General construction	3.27	Good
	Language use	3.33	Good
5	General construction	3.22	Good
	Language use	3.33	Good
6	General construction	3.27	Good
	Language use	3.33	Good
Overall validity		3.33	Good
Reliability		**0.96**	**Very high**

Daryanto & Dwicahyono (2014) argued that learning achievement tests are constructed with clear sentences that do not allow multiple interpretations. The validity evaluation factors include a valid overall construction, which includes instructions, scoring, technical, and time allocations. The language aspect as a whole is categorized as valid, including the use of Indonesian grammar and simple language. The learning achievement test is a written instrument that evaluates students' knowledge competence. A good instrument must also meet the following criteria: 1) the unity that represents the ability to be evaluated, 2) the type of equipment that is appropriate for its use, and 3) the application of appropriate language adjustments in instrument design (Rusman, 2017).

This validation value indicates that the learning achievement test is well-developed and meets the test standardization. The learning achievement test's reliability demonstrated a very high degree. This result indicates that when repeatedly administered, the learning achievement test produces consistent data. This learning achievement test can be assessed in class to determine whether indicators and learning objectives have been met. It is implemented directly in the classroom at the end of the meeting.

Practicality is taken to determine how convenient electronic instructional materials are to use. The instructional materials' efficacy is evaluated using a questionnaire that students fill out. The XI MIPA 4 MAN 2 Banjarmasin students received the answer form after completing all learning activities using the developed electronic instructional materials. The questionnaire contains statements, criticisms, and suggestions submitted via Google forms by students. Table 9 demonstrates the practical results.

Table 9 The practicality of instructional materials

Aspect	Score	Category
Benefits	3.35	Good
Accessibility	3.32	Good
The efficiency of learning allocation time	3.31	Good
Average	3.33	
Category	**Good**	

The students who completed the response questionnaire constituted 33 test subjects. The questionnaire is based on standards that classify a developed product as practical or not based on the advantages of electronic instructional materials, the efficiency of learning time, and the ease with which students use the third electronic instructional material for learning. The average score obtained on the provided questionnaire is used as a reference for evaluating the practicality of the instructional materials. The results of practicality are displayed in Table 5. According to Alfanika (2018), the practicality evaluation can be a questionnaire online. Questionnaires are

one of the instruments used to investigate perspectives on the use of developed electronic instructional materials (Saputro, 2021).

According to Mujizah et al. (2020), assessing the practicality of electronic instructional materials evaluates multiple factors, including convenience, benefits, and efficacy. In accordance with the conducted research, this practicality is evaluated based on these three factors. Based on the average score per aspect, the practicality category granted a practicality score to the benefit of electronic instructional materials. The development indicators for this aspect include the usefulness of electronic instructional materials in learning physics, such as whether or not students can easily comprehend the material and independently comprehend the concepts of physics, the linkage of instructional materials to Quran verses, and whether or not the materials create motivation and boredom. The practical category of the benefits of instructional materials indicates that most students respond positively to the utility of electronic instructional materials. The value attained in this aspect demonstrates that electronic instructional materials have assisted students during the learning process, can avoid monotonous learning environments, and can be used independently. Related to this, Prastowo (2017) reveals that instructional materials are deemed good when they are easy for students to use independently.

The convenience aspect of electronic instructional materials received a practicality score in the practical category, based on the average score per aspect. The indicators developed for this aspect of convenience about the ease with which electronic instructional materials facilitate students' comprehension, including the language use, the size and shape of writing, the ease of accessing electronic instructional materials, and the ease of accessing features offered. The developed electronic instructional materials can facilitate students, particularly in terms of presentation and packaging. The font used in the display of electronic instructional materials is carefully considered so that students have no trouble reading and comprehending the material. In accordance with this, Rusman (2017) asserts that the characteristics of good electronic instructional materials must consider the components of the level of media readability (visual literacy), including colors, font selection, font size, and writing layout.

The efficiency element of electronic instructional materials received a practicality score in the practical category based on the average score per aspect. The indicators devised for this aspect of efficiency pertain to the accuracy or suitability of physics learning materials, such as the timeliness and use of time when accessing electronic instructional materials. The efficiency aspect of the instructional materials is categorized as practical, indicating that most students respond positively to efficiency. From this aspect, it shows students' saving time and energy so that the learning time allotment can be utilized effectively. The presence of features such as hyperlinks can facilitate students' access to instructional materials without requiring excessive internet data packages (Jazuli et al., 2018).

The overall results regarding practicality reviewed through the students' questionnaire responses are categorized as practical. This classification indicates that the development of electronic instructional materials conforms to the criteria for desirable qualities. This indicates the applicability of the expression from Landa et al. (2021), which states that it is simpler and quicker for students to obtain information with flexible time in accessing content as long as they are connected to the internet. This statement is in line with the assertion of Indriani et al. (2018) that electronic instructional materials are digital learning resources that are unlimited and readily accessible

to students. Electronic instructional materials developed can be declared practical and feasible when teachers and students are facilitated in the learning process (Muzijah et al., 2020). Instructional materials developed are deemed practical if assist teachers in imparting instruction (Kuncahyono, 2018). The questionnaire results based on the student's responses have met the feasibility of learning activities and are practical in terms of convenience, benefits, and efficiency.

The effectiveness of instructional materials is evaluated using the learning achievement test and the N-gain score. N-Gain can be calculated by comparing students' pretest and posttest scores (Wahidah et al., 2019). A learning achievement test is a tool in the form of a test necessary for determining students' success in an educational program. The learning achievement test can be pretests and posttests to examine students' knowledge at the beginning and determine the achievement of applicable basic competencies at the end of learning (Sani et al., 2020). According to Rochmad (2012), the research and development of a product can be deemed effective if it is evaluated using the learning achievement test. The N-gain score is shown in Table 10, where the results are classified as high.

Table 10 The effectiveness of the instructional materials

	Pretest Average Score	**Posttest Average Score**
	14.9	79.1
N-Gain	0.75	
Category	**High**	

The learning achievement test consists of six questions divided into four questions regarding applying physics and two about analysing experimental data. The test questions are divided into two cognitive domains, namely C3 and C4. In terms of academic learning achievement, the minimum comprehensive standard established by the school is 75, and 27 students satisfy the minimum comprehensive standard, while six students have not met the minimum.

The pretest data are displayed in the calculation table in the appendix. According to these data, the lowest score on the pretest is two and the maximum score is 32. This indicates that the student's pretest scores and capacity to solve problems involving sound waves are very low. A few students could identify the known and uncertain variables on this pretest. However, students have been unable to identify and apply the correct formula to calculate the correct value. Students have not been able to analyze and draw conclusions from experimental data correctly, nor do they conclude the answers obtained. The student's inability to solve problems involving sound waves is due to their lack of comprehension of sound wave material, resulting from the absence of this instructional material.

The average post-test results do not meet the minimum completion criterion because some students did not answer the questions precisely, so they only received a score based on their answers. Students have not used physics quantities appropriately. As a result, they spend more time on calculations, and their answers to data analysis questions are incomplete, resulting in low assessment scores.

Some students only mention the known and questionable variables at the C3 and C4 levels of questions on applying physics formulas, but they cannot apply the formula correctly in sufficient detail. Some students could answer data analysis questions and form conclusions about the results of the attached experiment. Still, their analysis of the provided data was not accurate and precise. According to the pretest results, most students struggled with nearly all questions. This is due to the absence of learning implementation. Most students can surmount the difficulties they encountered on the pretest after learning, as evidenced by their improved

performance on the posttest compared to the pretest.

The students' improved learning outcomes result from their familiarity with working on examinations in the form of practice questions conducted at each class meeting. The process of responding to these questions is conducted using discussion so that students provide the best answers based on the discussion results and can minimize misunderstandings in each student, with experimental and data analysis worksheets as support. This is in accordance with the model employed, a multimodel consisting of three models: direct instruction, cooperative learning, and generative learning, which provides students with comprehension, group work, expressing opinions, discovering knowledge, and discussing with peers and teachers. This is evident from the N-gain results, which are in the high category.

Instructional materials incorporating the Quran, such as motivation, the connection of sound material, and several verses from the Quran in the section *Kalamullah dan Ayo Buka Quran* in the instructional materials, make it easier for students to comprehend the relationship between physics and Quran. According to Yulianti & Achyani (2017) instructional materials with Quran verses integration are feasible to implement and can enhance students' learning outcomes. This role is crucial for enhancing student learning outcomes. The high N-gain score indicates that the developed instructional materials are very effective and usable.

CONCLUSION

The electronic instructional materials based on multimodel learning on sound waves material with Quran verses are applicable to the learning and teaching process. This is because the instructional materials are equipped with *Kalamullah dan Ayo Buka Quran*, which links sound phenomena and the verses of the Quran. The results of data analysis and conclusions showed that the electronic instructional materials incorporating Quran verses fulfill the valid, practical and effective categories. The following express this conclusion: 1) Validity is deemed valid based on the results of the assessment by academics and practitioners, with details of the lesson plan validity of 3.44 (very good), the student worksheet validity of 3.27 (good), the instructional materials validity of 3.30 (good), and the learning achievement test validity of 3.33 (good). 2) Practicality received an overall average score of 3.33 in the good category, and 3) Effectiveness received an average score of 0.75 in the high category. Therefore, the electronic instructional material based on multimodel learning on sound waves material with Quran verses is deemed effective for academic use and can enhance student learning outcomes.

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