

# Validity of Learning Material About Particle Dynamics Contained Quranic Verses Using Direct Instruction Model

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**Abstract.** The use of learning materials contained Quranic verses in physics subject will contribute to train and optimizing problem solving skills to students. This article aims to describe the validation of learning materials of particle dynamics contained Quranic verses using direct instruction teaching model. The development research used ADDIE model with learning materials as the subject of the research and validity data and suggestions for improvement by 3 academics and 2 practitioners. Validation is one of the processes at the part of the development stage. The validity of learning materials is measured using a validation sheet and then determined based on validation by expert which are stated or invalid. If valid, it will be categorized again as very high, high, enough, low, and very low. The conclusion of this article is learning materials contained Quranic verses using direct instruction teaching model is valid and categorized as very high. Based on data analysis, it can be concluded that learning materials are eligible to be used in learning process.

**Keywords:** Learning materials, problem solving.

**Running title:** Validity of learning materials

## INTRODUCTION

Education in the era of globalization must be able to prepare students in several competencies, namely intellectual competence, personal competence, communicative competence and socio-cultural competence to face the challenges of changing times that continue to develop. (Istiarsono, 2017). National education aims to develop the potential of students to become human beings who believe in and fear God Almighty, have noble character, are healthy, knowledgeable, capable, creative, independent, and become democratic and responsible citizens. (UU No. 20, 2003). Minister of Education and Culture Regulation No. 36 of 2018 concerning the 2013 Curriculum is designed to develop spiritual and social attitudes, knowledge, and skills and apply them in various situations in schools and communities.

Oviana (2015) explained that every teacher who implements the 2013 curriculum must be able to present material and learning processes that lead to the achievement of core competencies, namely spiritual attitudes. Minister of Education and Culture Regulation No. 20/2018 Article 1 states that strengthening character education is an educational movement to strengthen the character of students through the harmonization of heart, feeling, thinking, and sports. Exercise your heart to strengthen your faith and devotion and noble morals to form a superior personality. Flavor to enhance creativity and creativity. Exercise to improve physical health and kinesthetic skills. Thinking to build competence and independence of technology science (Khaeruddin, 2011). In order to build scientific competence, especially in the field of science such as physics, problem solving is very important in learning physics.

Problem solving is a skill and a process, said to be a skill because it is done repeatedly and it is said to be a process because it requires a number of steps (Purushothama, 2015). Problem solving is a basic process for identifying problems, considering options and making choices to solve

problems based on information with 7 problem-solving steps, namely: (1) Drawing a simple diagram or sketch; (2) Write down information or data on the image; (3) Identifying unknown variables; (4) Analyze problem solving; (5) Write down the relevant equations; (6) Substituting information and solving problems; (7) Interpretation (Greenstein, 2012 and Gaigher, 2006).

Particle dynamics is one of the real physics material because there are many applications or events in everyday life related to Newton's First Law, Newton's Second Law and Newton's Third Law. This material requires declarative knowledge because it contains concepts, principles, laws and applications in everyday life, so that declarative knowledge is needed so that students can understand information both factual and conceptual. This material also requires procedural knowledge because students will know the steps in a process both investigative activities in the form of practicum and solving physics problems, so that students can more easily understand the material and problem solving skills of students can be trained. This material can be delivered by the teacher by directly explaining the content of the material so that students can understand and solve physics problems that are taught in depth, especially at the level of analyzing questions.

One of the efforts made to train spiritual attitudes and problem solving skills is by developing Handouts that can practice students' spiritual attitudes and problem solving skills. The results of previous research stated that physics Handouts integrated with the values of the Quran can improve students' problem solving abilities (Komalasari, 2018). The learning model used in the learning process is determined based on the characteristics of students and the material to be taught. Direct teaching is also called teacher-centered learning because almost all learning decisions are determined by the teacher, the teacher demonstrates the knowledge or skills that will be trained to students step by step (Suyidno & Jamal, 2012). This is based on previous research that through the direct teaching model with

Handouts that contain character values can improve the spiritual attitudes of students (Ilmiwan, Masril and Darvina, 2013) and through direct teaching models can improve the problem solving abilities of students (Habibi, Zainuddin and Misbah, 2017).

In the process of developing dynamic particles Handouts with Quranic verses using a direct teaching model, must go through an evaluation process from experts. This process is called validation which will determine the correctness of the Handout being developed (Dewantara, Mahtari, & Haryandi, 2020; Mastuang et al., 2020). This article aims to describe the validity of the dynamic learning materials of particles with Quranic verses using a direct teaching model.

## MATERIALS AND METHODS

### Research Place

The research was conducted at the Physics Education Study Program, Teacher Training and Education Faculty Universitas Lambung Mangkurat in May 2020 the full semester of the 2019/2020 academic year.

### Procedures

The type of research used is research and development with the ADDIE model consisting of Analyze, Design, Development, Implementation, and Evaluation (Tegeh, Jampel and Pudjawan, 2014). The steps carried out with the ADDIE model are as follows:

#### Analyze

The level of analysis is done to find out

- Competencies to be achieved are (3.7) analyzing the interaction of forces and the relationship between force, mass and motion of objects in straight motion; (4.7) conducted the experiment and the presentation of the results regarding the interaction of forces and the relationship of force, mass and acceleration in straight motion and their physical meanings.
- Characteristics of students, namely the problem solving skills of students are still low and students still do not know the relationship between physics and the verses of the Qur'an
- Characteristics of material, namely particle dynamics material is real because there are many applications or events in everyday life related to Newton's First Law, Newton's Second Law and Newton's Third Law and this material requires declarative knowledge and procedural knowledge.

#### Design

The design stage is carried out by describing the basic competencies to the learning objectives; The development stage is carried out by making dynamic Handouts products containing the verses of the Qur'an, validating Handouts and simulations.

#### Development

The development stage is carried out by making particle dynamics Handouts products containing verses of the Qur'an, validating Handouts and simulations. The Handouts developed included lesson plans, student worksheets,

Handouts, and learning outcomes tests, as well as validity data and suggestions for improvement by 3 academics and 2 practitioners.

### Implementation

The implementation phase was carried out by testing Handouts on 22 students of the Physics Education Study Program Universitas Lambung Mangkurat.

### Evaluation

The evaluation stage is carried out by correcting or revising the dynamic Handouts of particles with Quranic verses if deemed necessary. Evaluation is carried out in a formative manner by collecting data at each stage carried out to improve Handouts in order to obtain Handouts with the expected specifications, revision if needed.

### Data analysis

The quality of particle dynamics Handouts with Quranic verses is shown by the element of validity. Validity is an attempt to obtain a learning device with validation that is very valid if the validation criteria show conformity between the learning device and the theoretical basis of its preparation (Akbar, 2016). The validity of particle dynamics Handouts with the verses of the Qur'an using the direct teaching model in this study was tested by 5 validators. The analysis technique from the results of the assessment of the validity of the Handouts developed is as follows.

$$\text{Percentage of validity} = \frac{X}{X_{\text{maks}}} \times 100\%$$

Keterangan:

X : The total score of the validation results from the validator

X<sub>maks</sub> : Maximum total score

Table 1. Criteria for the validity of learning materials.

No.	Percentage of validity	Category
1	80.01% - 100.00%	Very high
2	60.01% - 80.00%	High
3	40.01% - 60.00%	Enough
4	20.01% - 40.00%	Low
5	01.00% - 20.00%	Very Low

Note: Akbar, 2016.

## RESULTS AND DISSCUSSION

Products developed in the form of Handouts containing Al-Quran verses to use a direct teaching model that can train students' problem solving skills. The results of the development of Handouts are used to support the process of teaching and learning activities in accordance with the characteristics of students and the characteristics of the Particle Dynamics material for class X SMA.

**Validity of Lesson Plan**

The lesson plan developed is based on the syllabus of SMA Negeri 12 Banjarmasin, namely Curriculum 2013. The development of Handouts consists of 3 lesson plans or

three meetings with a time allocation of  $2 \times 45$  minutes (2 learning hours). The subject matter at meeting one, two and three is Newton's First Law, Newton's Second Law and Newton's Third Law.

RENCANA PELAKSANAAN PEMBELAJARAN (PERTEMUAN 2)		SKENARIO KEGIATAN	
Sekolah : SMA Negeri 12 Banjarmasin Mata Pelajaran : Fisika Kelas/Semester : X/Genap Materi Pokok : Dinamika Partikel Sub Materi Pokok : Hukum II Newton Alokasi Waktu : $2 \times 45$ Menit		<b>Kegiatan Pendahuluan (10 menit)</b> Fase 1 Mempersiapkan siswa dan menyampaikan tujuan pembelajaran. 1. Guru mengucapkan salam, menanyakan kabar dan membimbing peserta didik berdoa sebelum memulai pembelajaran. 2. Guru mengecek kehadiran peserta didik dengan bertanya "Apakah ada yang tidak hadir hari ini?". 3. Guru mengingatkan peserta didik pada materi tentang Hukum I Newton. Guru memotivasi peserta didik dengan menampilkan sebuah gambar beberapa orang mendorong mobil yang mogok.	
<b>A. KOMPETENSI INTI</b> KI 1 : Menghayati dan mengamalkan ajaran agama yang dianutnya. KI 2 : Menunjukkan perilaku jujur, disiplin, tanggung jawab, peduli (gotong royong, kerja sama, toleran, damai), santun, responsif, dan pro-aktif sebagai bagian dari solusi atas berbagai permasalahan dalam berinteraksi secara efektif dengan lingkungan sosial dan alam serta menempatkan diri sebagai cerminan bangsa dalam pergaulan dunia. KI 3 : Memahami, menerapkan, menganalisis pengetahuan faktual, konseptual, prosedural berdasarkan rasa ingintahunya tentang ilmu pengetahuan, teknologi, seni, budaya, dan humaniora dengan wawasan kemanusiaan, kebangsaan, kenegaraan, dan peradaban terkait penyebab fenomena dan kejadian, serta menerapkan pengetahuan prosedural pada bidang kajian yang spesifik sesuai dengan bakat dan minatnya untuk memecahkan masalah. KI 4 : Mengolah, menalar, dan menyaji dalam ranah konkret dan ranah abstrak terkait dengan pengembangan dari yang dipelajarinya di sekolah secara mandiri, dan mampu menggunakan metode sesuai kaidah keilmuan.		 <p>Sumber: <a href="https://www.harian7.com/2018/07/semangatnya-dua-anggota-polsek.html">https://www.harian7.com/2018/07/semangatnya-dua-anggota-polsek.html</a>                      Kemudian guru mengajukan pertanyaan "Pernahkah kalian melihat orang mendorong mobil yang mogok? Perhatikan pula gambar tersebut. Ada orang bersama-sama mendorong mobil yang mogok. Bagaimanakah keadaan mobil yang diberi gaya dorong itu? Apakah dapat bergerak atau masih tetap diam? apa yang terjadi jika yang mendorong mobil tersebut hanya satu orang?"</p>	
<b>B. KOMPETENSI DASAR</b> 3.7 Menganalisis interaksi gaya serta hubungan antara gaya, massa dan gerakan benda pada gerak lurus. 4.7 Melakukan percobaan berikut presentasi hasilnya terkait interaksi gaya serta hubungan gaya, massa dan percepatan dalam gerak lurus serta makna fisiknya.			
<b>C. INDIKATOR PENCAPAIAN KOMPETENSI DASAR</b> 3.7.2 Memformulasikan hubungan antara gaya dengan percepatan pada Hukum II Newton. 4.7.1 Melakukan percobaan Hukum II Newton.			

Figure 1. Display of lesson plan.

The lesson plans consist of: (1) School identity; (2) Subject identity; (3) Class / Semester; (4) Main material; (5) Sub main material; (6) Allocation of time; (7) Core competencies; (8) Basic competence; (9) Basic competency achievement indicators; (10) learning objectives; (11) The learning material that has been determined is in accordance with the subject matter; (12) Approach; (13) Learning model; (14) Learning methods; (15) Learning steps or syntax in accordance with the model used; (16) Media, tools / materials and learning resources; (17) assessment

techniques; and (18) Bibliography. Lesson Plan development results can be seen in the attachment. Lesson Plans are equipped with learning motivation related to life events and their relation to Al-Quran verses and learning steps designed to be able to practice problem solving skills and students can link learning with Al-Quran verses. Problem solving skills are trained in core learning activities in the second part of phase 2 (demonstrating declarative knowledge and procedural skills).

Table 2. Validity Result of Lesson Plan.

Aspects of Assessment	Percentage	Category
Format of Lesson Plan	86.5%	Very high
Language	82.0%	Very high
The contents of Lesson Plan (objectives, learning activities, support tools and time allocation)	86.8%	Very high
Validity	86.2%	Very high
Reliability	0.97	Very high

Table 2 shows that the developed Lesson Plan has an average percentage of validity of 86.2% in a very high category with a degree of reliability of 0.97, very high, so it can be said that the developed Lesson Plan is appropriate and suitable for use in the learning process.

The very high category Lesson Plan format shows that the resulting Lesson Plan format has a Lesson Plan format that is in accordance with the reference for the preparation of the 2013 curriculum learning framework. and learning media (Permendikbud No. 22/2016). The very high category of language aspect shows that the resulting Lesson Plan uses good and correct Indonesian. Daryanto and Dwicahyono (2014) suggest that the lesson plan must be prepared in clear language so that it can be used by other teachers without causing multiple interpretations.

The content aspect of the Lesson Plan is very high, indicating that the resulting Lesson Plan contains clear

learning objectives, the Lesson Plans are arranged in a clear, consistent manner and in accordance with the model used, and the Lesson Plans are made by considering the appropriate time allocation for learning. Daryanto and Dwicahyono (2014) suggest that learning objectives must have a line of thought that is interrelated with the competencies to be achieved, indicators that can show learning outcomes that describe the achievement of basic competencies, indicators and learning objectives are also compiled with operational sentences and steps. learning is structured systematically so that learning objectives are achieved, arranged in as much detail as possible so that if the lesson plan is used by other teachers it is easy to understand without causing multiple interpretations. A good lesson plan, learning objectives are formulated based on Basic Competencies using operational verbs that can be observed and measured (Regulation of the Minister of

Education and Culture No.22 of 2016). According to Akbar (2016), the lesson plan has a high value of clear learning objectives, clear descriptions of Handout in accordance with the learning objectives, learning scenarios that are described in detail, completely and reflecting the models

and methods used in learning. The time allocation must be written down at each learning stage and adjusted to the need to achieve Basic Competence (Regulation of the Minister of Education and Culture No. 22/2016).

**Validity of Student's Worksheet**

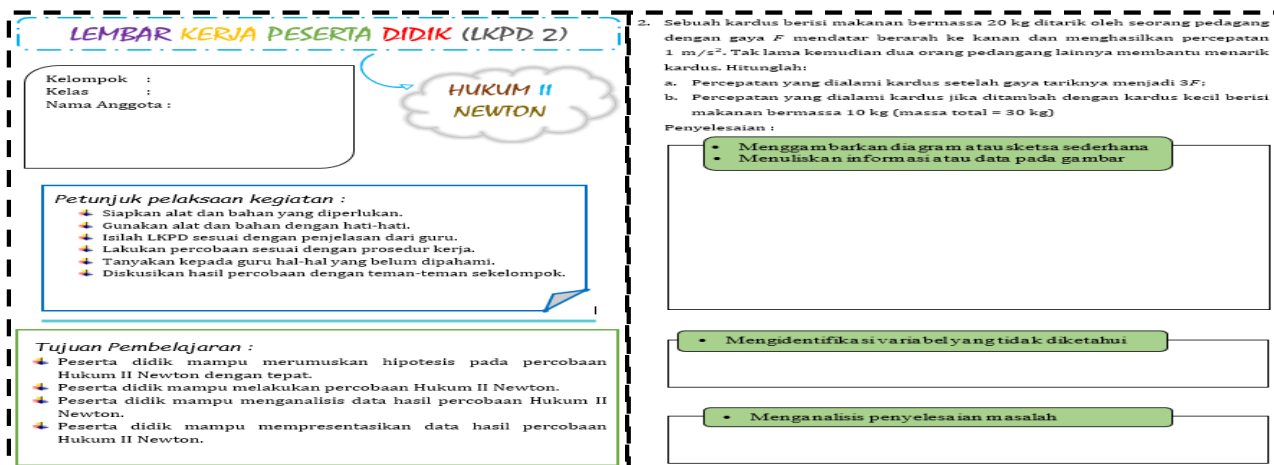


Figure 2. Display of Student's Worksheet.

Student Worksheets are sheets containing tasks that must be done by students in the form of theoretical or practical assignments. Student Worksheets developed using a direct teaching model at each meeting. The developed Student Worksheets consist of three experimental Student Worksheets and three Student Worksheets with questions adjusted to the number of meetings. At the first meeting, the experimental Student Worksheet was designed for Newton's First Law experiments and the Student Worksheet questions for the subject matter of Newton's First Law. At the second meeting, the experimental Student Worksheet was designed for the Newton Law II experiment and the Student Worksheet questions for the subject matter of Newton's Second Law. At the third meeting, the experimental Student Worksheet was designed for Newton's Law III experiment and Student Worksheet questions for the subject matter of Newton's Third Law. Experimental Student Worksheets that are made consist of: (1) Title of Student Worksheet; (2) study instructions; (3) learning objectives; (4) learning materials that have been determined in accordance with the main material; (5) The purpose of the experiment; (6) Problem formulation; (7) Hypothesis Formulation; (8) Identification of variables; (9) The operational definition of the variable; (10) experimental design; (11) data analysis; and (12) Conclusion. Student Worksheet questions consist of questions to practice problem solving skills in accordance with the subject matter of learning at each meeting.

Design of student worksheet	80.0%	Very high
Format of student worksheet	82.1%	Very high
Language	83.7%	Very high
Content of student worksheet	83.3	Very high
Validity	81.7%	Very high
Reliability	0.62	High

Table 3 shows that the student worksheet developed has an average percentage of validity of 81.7% in the very high category with a degree of reliability of 0.62 in the high category, so it can be said that the student worksheet developed is appropriate and suitable for use in the learning process.

The very high category of experimental student worksheet design aspects shows that student worksheets are arranged in a sequence of practical activities in accordance with scientific procedures, namely meeting objectives, problem formulation, hypothesis formulation, variable identification, variable operational definitions, tools and materials, experimental procedures, data analysis and conclusions. This is in accordance with the statement of Suyanto (2009), namely that the experimental student worksheets are presented containing laboratory activities (scientific procedures). The very high category aspect of the student worksheet format shows that the student worksheets are arranged in a good design, clear numbering and can be read clearly. This is in line with Prastowo's (2015) statement which states that student worksheets must be made attractive and easy to read so that students can easily understand the activities listed on student worksheets.

Table 3. Validity result of student worksheet.

Aspects of Assessment	Percentage	Category
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The very high category of language aspect shows that the student worksheets use language that students can understand. Prastowo (2015) suggests that there are two factors that must be considered in compiling student worksheets, namely the level of students' reading ability and students' knowledge. The use of language that is simple, clear and in accordance with the level of thinking of students on this student worksheet is intended to fulfill these factors.

The very high category of the content aspect indicates that the student worksheets arranged can achieve the

predetermined learning objectives. The content of student worksheets must be related to learning objectives (Dewantara, Mahtari, Misbah, & Haryandi, 2019; Mahtari, Wati, Hartini, Misbah, & Dewantara, 2020; Misbah, Dewantara, Hasan, & Annur, 2018; Prastowo, 2015). This is intended so that student worksheets can accommodate the achievement of learning objectives and make it easier for students to learn, both with teacher guidance and self-study.

**Validity of handouts**

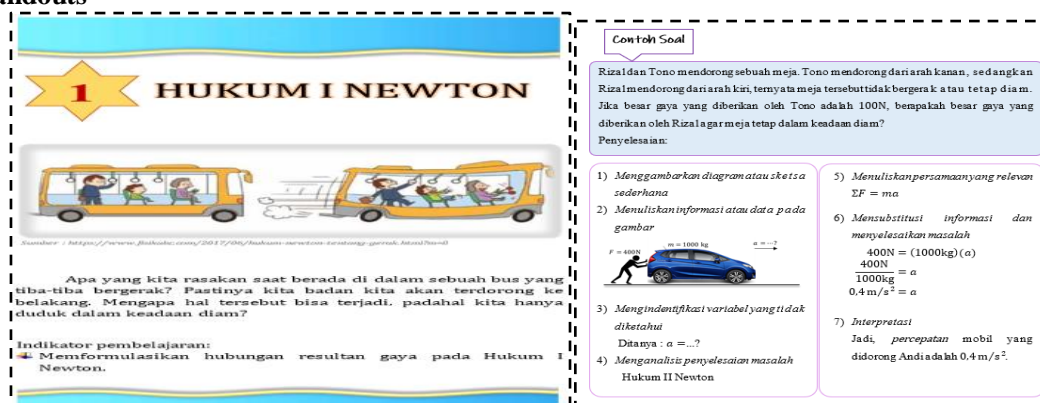


Figure 3. Display of Handouts.

Handouts are brief learning materials sourced from several literature that are relevant to basic competencies and the main material taught and given to students to make it easier for students to follow the learning process. Handouts are arranged systematically based on the school syllabus and adapted to the teaching model used. Handouts are made using language that is easy for students to understand and pictures for student motivation. The handout developed consists of 3 meetings according to the number of lesson plans and student worksheets. The subject of the Handout is Newton's First Law, Newton's Second Law and Newton's Third Law. The handouts developed consisted of: (1) overall cover handouts; (2) Foreword; (3) Table of contents; (4) Concept maps; (5) Instructions for use; (6) learning indicators; (7) Description of the material; (8) Images that support the description of the material; (9) Verses of the Koran that are relevant to the material description; (10) Examples of questions; (11) Questions on the exercise "Let's practice"; (12) Summary; (13) Competency test; (14) Glossary; and (15) Bibliography. The handout developed contains verses from the Al-Quran related to the material being taught so that students know that physics has a lot to do with Al-Quran verses. Handouts are arranged in such a way as to help students learn. The Handout design is made in color and each section is given motivation taken from events in daily life. Each important equation and legal sound is marked with a colored box so that it is easy for students to remember. The handout is also equipped with sample questions and their solutions that can practice problem solving skills. To support students' understanding,

practice questions are given in accordance with the example questions given.

Table 4. Validity Result of Handout.

Aspects of Assessment	Percentage	Category
Format of Handout	85.4%	Very high
Qualification of language	83.0%	Very high
Qualification of content	95.7%	Very high
Qualification of presentation	85.0%	Very high
Validity	84.4%	Very high
Reliability	0.98	Very high

Table 4 shows that the Handout developed has an average percentage of validity of 84.4% in the very high category with a degree of reliability of 0.98 in the high category, so it can be said that the Handout developed is appropriate and suitable for use in the learning process.

The aspect of the format of Handouts in the very high category indicates that the Handouts developed are structured to be attractive and have good print quality. Yunianti and Wahyudi (2014) suggest that the characteristics of good Handout are presented attractively with pictures if necessary. BSNP (2008) states that the print quality of Handouts must also be in good condition.

The very high category of language aspect shows that the Handouts developed are prepared using good and correct Indonesian rules. Yunianti and Wahyudi (2014) suggest that the characteristics of good Handouts are

written in good language and easy to understand. Handouts must contain information, messages, knowledge that are logically derived, easy to accept and in accordance with the stages of student cognitive development. Besides that, the use of correct Indonesian rules is also important in the preparation. The terms in the material are presented clearly and correctly. Ideas are also made sequential and communicative (BSNP 2008).

The aspect of the feasibility of the content is very high, indicating that the Handouts developed are in accordance with the basic competencies to be achieved. According to BSNP (2008), the content component has a standard that Handouts must refer to the targets to be achieved by students, namely basic competencies, this component can be assessed from the completeness, depth and breadth of the material.

The feasibility aspect of the presentation in the very high category shows that the Handout presented is able to stimulate the minds of students because the concept of the material used is in everyday life and even experienced by

students so that it raises feedback and is able to generate curiosity (BSNP 2008).

**Validity of Learning Outcomes Test**

Learning outcomes tests are used to measure the extent to which learners have mastery of the material being taught or the extent to which students are able to achieve predetermined learning objectives. Learning Outcomes Tests are made based on Basic Competencies and indicators to be achieved. In addition, a complete question grid with answer keys and detailed scoring guidelines was made so that other teachers could use it. The Learning Outcomes Test developed by the researcher consisted of instructions for working on the questions and seven items representing each learning objective in the form of an essay. These questions are in the cognitive domains C2, C3 and C4. The seven items included two questions to analyze the experimental table and five questions to apply equations to physics problems in everyday life.



Figure 4. Display of Learning Outcomes Test.

Table 5. Validity result of learning outcomes test.

Question Number	Aspects of Assessment	Percentage	Category	Validity
1	General construction	84.1%	Very high	82.2% (Very high)
	Language	82.5%	Very high	
	Time	70.0%	High	
2	General construction	84.1%	Very high	81.6% (Very high)
	Language	80.0%	Very high	
	Time	70%	High	
3	General construction	78.3%	High	77.7% (High)
	Language	80.0%	Very high	
	Time	70.0%	High	
4	General construction	88.3%	Very high	85.5% (Very high)
	Language	85.0%	Very high	
	Time	70.0%	High	
5	General construction	85.8%	Very high	84.4% (Very high)
	Language	87.5%	Very high	
	Time	70.0%	High	
6	General construction	85.0%	Very high	84.4%

	Language	90.0%	Very high	(Very high)
	Time	70.0%	High	
7	General construction	90.0%	Very high	87.2% (Very high)
	Language	87.5%	Very high	
	Time	70.0%	High	
	Validity	83.33%	Very high	
	Reliability	0.66	Very high	

Table 5 shows that the developed learning outcome test has an average percentage of validity of 83.33% in the very high category with a reliability degree of 0.66 in the high category, so it can be said that the developed learning outcome test is appropriate and suitable for use in the learning process.

The learning outcome test developed by the researcher consists of instructions for working on the questions and seven items representing each learning objective in the form of an essay. The questions that have a very high validity category are questions number 1, 2, 4, 5, 6 and 7, while the questions in the high category are question number 3. The developed learning outcome tests are arranged on clear questions and commands and a score that corresponds to the cognitive level. question. Learning outcome tests were also developed so that students could easily understand them and use the correct Indonesian language rules. Daryanto and Dwicahyono (2014) state that the learning outcome test must use clear sentences and do not cause multiple interpretations. The results of this validation indicate that the developed learning outcome test can measure the effectiveness of learning (Daryanto and Dwicahyono, 2014). Reliability The learning outcome test shows a high degree of reliability. The results of this reliability indicate that the learning outcome test produces consistent data when tested many times (Arikunto, 2014).

### CONCLUSIONS

The conclusion of this article is that the dynamic Handouts of particles with the verses of the Koran using a direct teaching model are valid with a very high category. Thus this Handout can be implemented to go through the next development stage, namely developmental testing and continued at a further stage.

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