



# Types of Force and Their Utilization: Guided Inquiry-Based Interactive E-LKPD for Fourth Grade Elementary School Students

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## ABSTRAK

Masih banyak kegiatan pembelajaran IPA yang kurang menyenangkan. Kegiatan pembelajaran masih bersifat teacher center. Hal ini menyebabkan siswa kurang fokus sehingga berdampak pada hasil belajar IPA. Tujuan penelitian ini yaitu menciptakan E-LKPD interaktif berbasis inkuiri terbimbing pada muatan IPA materi macam-macam gaya dan pemanfaatannya untuk siswa kelas IV sekolah dasar. Jenis penelitian ini yaitu penelitian pengembangan dengan model ADDIE. Subjek penelitian berjumlah 6 orang yang terdiri dari 2 ahli materi, 2 ahli media, dan 2 ahli praktisi. Subjek uji coba produk yaitu siswa kelas IV sekolah dasar yang berjumlah 10 orang siswa. Metode mengumpulkan data yaitu kuesioner. Instrumen yang digunakan yaitu kuesioner. Teknik yang digunakan untuk menganalisis data yaitu analisis deskriptif kualitatif dan kuantitatif. Hasil penelitian yaitu Rata-rata penilaian yang berikan oleh ahli media pembelajaran yaitu 47 sehingga mendapatkan kualifikasi sangat baik. Rata-rata penilaian yang berikan oleh ahli materi pembelajaran 46,5 sehingga mendapatkan kualifikasi sangat baik. Rata-rata penilaian yang diberikan guru yaitu 62,5 dan respon siswa yaitu 47,8 sehingga mendapatkan kualifikasi sangat baik. Maka, E-LKPD Interaktif Berbasis Inkuiri Terbimbing pada Muatan IPA valid dan layak digunakan dalam proses pembelajaran. Implikasi penelitian ini diharapkan guru dapat menggunakan E-LKPD interaktif berbasis inkuiri terbimbing dalam proses pembelajaran.

## ABSTRACT

There are still many science learning activities that are less fun. Learning activities are still teacher center. It causes students to lack focus. It has an impact on science learning outcomes. This research aims to create an interactive E-LKPD based on guided inquiry on the science content of various styles of material and their use for fourth-grade elementary school students. This type of research is development research with the ADDIE model. The research subjects were six people consisting of two material experts, two media experts, and two practitioner experts. The subject of the product trial was fourth-grade elementary school students, totaling ten students. The method of collecting data is a questionnaire. The instrument used is a questionnaire. The data analysis techniques are descriptive, qualitative, and quantitative. The study results are that the average assessment given by learning media experts is 47, so they get very good qualifications. The average assessment given by learning material experts is 46.5, so they get very good qualifications. The average assessment given by the teacher is 62.5, and the student response is 47.8, so the qualifications are very good. So, the Guided Inquiry-Based Interactive E-LKPD on Science Content is valid and feasible to use in the learning process. This research implies that teachers can use guided inquiry-based interactive E-LKPD in the learning process.

## 1. INTRODUCTION

Education today requires students to have the ability to think critically, creatively, and innovatively. It is supported by technological advances that are growing rapidly, making it easier for teachers to package learning to be interesting (Hamzah et al., 2021; Luik et al., 2018; Purwowidodo, 2017). Factors influencing learning success are teachers, curriculum, learning resources, and the environment (Putro et al., 2017; Roling et al., 2020; Widyatmojo & Muhtadi, 2017). Learning must be packaged attractively to achieve maximum learning objectives (Zaenab et al., 2020). An interesting, fun, and directed learning atmosphere will make it easier for students to

learn and achieve learning goals (Gunawan et al., 2019; Herayanti et al., 2017). In achieving the learning objectives, we need an appropriate method, strategy, media, or learning device to support the effectiveness of the learning process, especially in science subjects (Astalini et al., 2020; Dewi et al., 2018; Tanti et al., 2020). Science learning should be able to free students to interpret certain things. All students are expected to produce independent and meaningful work in science learning. It is what causes students to take part in learning and understand the learning material well (Kusumayuni & Agung, 2021; Subali et al., 2019). Science is a science that studies all events in the universe. By learning science, students are expected to be able to understand the universe and natural events that occur (Astalini et al., 2020; Jampel et al., 2018). It makes learning science in elementary schools very important. Science can also help students understand other subjects, especially language and mathematics. In addition, learning science makes students familiar with the surrounding environment. Science learning must be packaged in a fun way so that students can follow the lesson well so that it has an impact on increasing student understanding.

There are still many science learning activities that are less fun. Previous research also stated that it also stated that there were still many students who had difficulty understanding science (Arisantiani et al., 2017; Bahari et al., 2018). Science learning activities still tend to lead to teachers and students only taking notes, so students feel bored in learning (Nur Jannah, 2020; Suantara et al., 2019; Wardani & Syofyan, 2018). When learning science, many students are passive and only focus on listening to the teacher deliver the material, so students often feel sleepy while studying (Cemara & Sudana, 2019; Widiartini et al., 2019). This problem was also found in the field. Based on observations made at SD Negeri 2 Patemon and SD Negeri 5 Patemon, learning activities are still teacher center. It causes students to be less focused when the teacher explains the material. Some students play with their seatmates because they are bored during science learning. In addition, students are less active or only passive in learning. Another problem is that teachers are less creative in providing teaching materials, media, learning tools, and facilities and infrastructure used during science learning. Another problem is that the development of learning tools in science learning is minimal. This certainly impacts science learning that is not optimal, so it affects learning outcomes that are lacking.

The solution is that science learning runs optimally by developing learning tools to facilitate student learning. It is reinforced by previous research stating that using appropriate learning tools can make learning activities more enjoyable and affect student learning outcomes (Gustin et al., 2020; Rovik, 2017). Learning devices are one of the components that teachers must prepare before learning activities (Amri & Tharikh, 2018; Dwitantra, 2015; Nurliawaty et al., 2017). It aims to achieve the desired goal. Learning tools are very important to be developed to improve the quality of learning. Learning tools are very important to be used by teachers so that learning activities become more efficient and effective so that the competencies set by the 2013 curriculum can be achieved optimally (Atmojo, 2018; Fatmawati, 2016; Nasution, 2019). In addition, using learning tools will make students much more enthusiastic and increase creative thinking in solving problems (Padmadewi, 2015; Salim Nahdi & Cahyaningsih, 2018). One of the learning tools that must be in elementary school is the student worksheet.

A student worksheet is one of the learning tools that present material and questions that aim to direct students to understand learning optimally (Maimunah et al., 2019; Rewatus et al., 2020). Student Worksheets can also be referred to as learning materials used by teachers so that students gain knowledge and understanding about the learning objectives to be achieved (Fuadati & Wilujeng, 2019; Kinanti et al., 2021; N. M. Sari et al., 2020). The use of Student Worksheets can also make students more active in learning. Developing the Student Worksheet must also be done systematically, practically, and simply so that students have no difficulty using it (Marshel & Ratnawulan, 2020). In addition, the presentation should also be simple and understandable to students when learning. Using Student Worksheets as teaching media is also one way to improve student learning activities. At this time, learning must be technology-based so that learning activities become flexible, so it is necessary to develop an electronic-based Student Worksheet (E-LKPD). E-LKPD is the same as a student worksheet in general, only on a digital-based E-LKPD that can be accessed via cellphone or laptop (Putra & Agustiana, 2021; Putra et al., 2021). E-LKPD is a guide for student worksheets in electronic form that makes material, questions, and pictures interesting so that E-LKPD is more interesting when compared to Student Worksheets in general.

Learning activities also not only require learning tools but also must consider learning methods. Learning methods must also be considered so that learning can make students participate in learning activities and be able to think critically (Dwipayana et al., 2018; Priyanti et al., 2017; Rahayuningsih, 2020). The learning method that can be applied is the guided inquiry-based learning method. Inquiry-based learning is a learning method that fully involves students' abilities to investigate problems logically, systematically, and critically so that students can formulate their findings well (Kumala, 2015; Sari et al., 2020). This learning method emphasizes that the teacher will guide students in carrying out activities by providing problems and solving students independently so they can hone students' critical thinking in solving problems (Citrawathi et al., 2016; Kohar et al., 2017). This learning can minimize how to learn to memorize. This learning emphasizes the teacher as a facilitator and guide while students seek and find learning materials.

Previous research findings stated that E-LKPD could make it easier for students to understand learning materials (Apriyanto et al., 2019; Yustina & Kapsin, 2017). Using E-LKPD can increase students' motivation and

impact learning outcomes (Putra & Agustiana, 2021; Putra et al., 2021). Guided inquiry-based learning methods can create a fun learning atmosphere (Khoirudin, 2016). Guided inquiry-based learning methods can improve student learning outcomes (Akhmalia et al., 2018; Kohar et al., 2017). There is no study on guided inquiry-based interactive E-LKPD on the science content of various styles of material and their use for fourth-grade elementary school students. The advantage of this research is that it will develop an E-LKPD equipped with image facilities that will make it easier for students to understand the material. In addition, E-LKPD is also based on guided inquiry which will improve students' critical thinking skills. This research aims to create an interactive E-LKPD based on guided inquiry on the content of science material in various styles and their use for fourth-grade elementary school students. It is hoped that the guided inquiry-based interactive E-LKPD can help students learn science.

**2. METHOD**

This type of research is development research that develops an interactive E-LKPD based on guided inquiry. The model used to develop guided inquiry-based interactive E-LKPD is the ADDIE model, which consists of analysis, design, development, implementation, and evaluation (Pramana et al., 2020). The research subjects were six people consisting of two material experts, two media experts, and two practitioner experts. The subject of the product trial is the fourth-grade elementary school students, totaling ten students. The method used to collect data is a questionnaire. Questionnaires are used to determine product validity from experts and students. The instrument used in collecting data is a questionnaire. The instrument grid is presented in Table 1, Table 2, and Table 3.

**Table 1. Media Expert Instruments**

No.	Indicator	Sub Indicator	Item Number
1.	E-LKPD Design	Color composition on E-LKPD.	1
		Clarity of images and videos of materials of various styles and their uses.	2
		Clarity and completeness of the contents of the E-LKPD.	3
		The suitability of the layout of images and videos.	4
		The combination of color images and letters on the Interactive E-LKPD follows elementary school students' characteristics.	5
2.	Ease of use	Clarity of E-LKPD instructions	6
		Ease of use of E-LKPD.	7
		Ease of accessing E-LKPD on various electronic devices, such as mobile phones and laptops.	8
3.	Utilization	Make it easier for students to receive learning materials.	9
		Interactive E-LKPD can make it easier for students to learn independently.	10
<b>Total</b>			<b>10</b>

**Table 2. Material Expert instruments**

No.	Indicator	Sub Indicator	Item Number
1.	The structure of the material presented.	The accuracy of the material with indicators of various styles and their use.	1
		The truth of the material concept of various styles and their uses.	2
		The materials of various styles and their uses are explained in the E-LKPD in a clear and easy-to-understand manner.	3
		The suitability of images and videos with materials of various styles and their uses.	4
		Interactive E-LKPD is developed in a clear, complete, and easy-to-understand manner.	5
2.	Use of grammar	Be consistent in the use of words or terms in the material.	6
		The language used follows the development of students.	7
		Clarity of information on the material of various styles and their uses.	8
3.	Presentation	The images and videos presented in the E-LKPD follow the material of various styles and their uses.	9
4.	Question suitability	The suitability of the questions with indicators on the material of various styles and their uses.	10
<b>Total</b>			<b>10</b>

**Table 3. Instruments of Practitioners (Teachers)**

No.	Indicator	Sub Indicator	Item Number
1.	The structure of the material presented.	The accuracy of the material with indicators of various styles and their use.	1
		The truth of the material concept of various styles and their uses.	2
		The materials of various styles and their uses are explained in the E-LKPD in a clear and easy-to-understand manner.	3
		The suitability of images and videos with materials of various styles and their uses.	4
		Interactive E-LKPD is developed in a clear, complete, and easy-to-understand manner.	5
2.	Use of correct grammar	Be consistent in the use of words or terms in the material.	6
		The language used follows the development of students.	7
		Clarity of information on the material of various styles and their uses.	8
3.	Ease of Use	Clarity of E-LKPD instructions.	9
		Ease of use of E-LKPD.	10
		Ease of accessing E-LKPD on various electronic devices.	11
4.	Utilization	Make it easier for students to receive learning materials.	12
		Interactive E-LKPD can make it easier for students to learn independently.	13
<b>Total</b>			<b>13</b>

The instrument's validity uses the Gregory formula, which two judges tested. Based on the results of the calculation of content validity, the coefficient of content validity of the media expert instrument is 1.00, the material expert is 1.00, the practitioner/teacher is 1.00, and the student response is 1.00, so the content validity qualification is very high. The data analysis techniques are descriptive, qualitative, and quantitative. Descriptive qualitative is used to process data in the form of advice from experts. Descriptive quantitative is used to process data in the form of scores given by experts and students regarding the product being developed.

**3. RESULT AND DISCUSSION**

**Result**

This research was conducted to develop an interactive E-LKPD based on guided inquiry on the science content of various styles and their uses for fourth-grade elementary school students using the ADDIE model. First, Analysis. The activities are analyzing existing problems, curriculum, and needs analysis. The result of problem analysis is that the teacher still conveys science material only by providing explanations to students without using learning tools that can make students more enthusiastic in learning activities. The results of the curriculum analysis are the guided inquiry-based Interactive E-LKPD which will be developed for the science content of various styles and their uses. The results of the analysis of student characteristics are that students like learning tools that present pictures that will make it easier for students to understand science material.

Second, Design. At this stage, the first thing to do is to choose material in science subjects, namely the various styles and their uses that will be developed in the Interactive E-LKPD. This Interactive E-LKPD is designed in an interactive form that contains material and questions in the form of attractive pictures and discusses various styles and their uses so that students are enthusiastic about participating in classroom learning. This E-LKPD can also be done online. The design for the development of the guided inquiry-based Interactive E-LKPD on science content is presented in [Figure 1](#).



**Figure 1. Design of Guided Inquiry-Based Interactive E-LKPD Development on Science Content**

Third, development. The development stage of the Interactive E-LKPD is carried out based on the planning results. In the research on the development of the Interactive E-LKPD, the content of science content, various styles of material, and their use for fourth-grade elementary school students, learning tools will be developed using Microsoft Office Word 2019 when making cover designs, determining materials, and questions, and designing on each page which is then converted into a pdf file and the creation of an Interactive E-LKPD using the Liveworksheets Website. Then on the video links, materials of various styles and their uses will be included on the Liveworksheets Website. The interactive e-LKPD that has been produced is 16 pages. The results of the development of the guided inquiry-based Interactive E-LKPD on science content are presented in Figure 2.



Figure 2. Interactive E-LKPD Based on Guided Inquiry on Science Content

Guided Inquiry-Based Interactive E-LKPD on Science Content was tested for validity by four media experts and learning material experts. The assessment results given by the first learning media expert were 48 and the second learning media expert 46. The average assessment the learning media expert gave was 47, so they got very good qualifications. The assessment results given by the first learning material expert are 46, and the second learning material expert is 47. The average assessment given by the learning material expert is 46.5, so the qualification is very good. It was concluded that the Interactive E-LKPD Based on Guided Inquiry on Science Content was valid. The assessment results given by the first teacher are 63 and the second teacher 62. The average assessment the teacher gives is 62.5, so it is in the very practical category. The student's response to the interactive E-LKPD is 47.8, so they get very good qualifications. It can be concluded that the Guided Inquiry-Based Interactive E-LKPD on Science Content is suitable for use in the learning process.

**Discussion**

Guided inquiry-based Interactive E-LKPD on the content of science material, various styles, and their uses are suitable for the learning process due to several factors. First, the guided inquiry-based Interactive E-LKPD on science content is feasible because it makes it easier for students to understand science material. Using appropriate learning tools will make it easier for students to understand the learning material (Atmojo, 2018; Dwitrantra, 2015; Fatmawati, 2016). In addition, the developed E-LKPD is adapted to the characteristics of students so that students can easily digest the information presented on the E-LKPD. It is in line with previous research, which states that elementary school students are 7-11 years old, so they are in concrete operational cognitive development (Al Sultan et al., 2018; Hacıeminoglu, 2016; Harrell & Subramaniam, 2015). Children at this stage can understand aspects of learning according to events that often occur around them (Nurlaily et al., 2019). The E-LKPD presents material and relates it to events that often occur around students so that students are easy to learn. Learning tools are very important to be developed to improve the quality of learning (Nur Utami & Mustadi, 2017; Sasono et al., 2017). Teachers must use learning tools to make learning activities more efficient and effective. Besides student worksheets, it will make students much more enthusiastic and increase creative thinking in solving their problems (Padmadewi, 2015; Salim Nahdi & Cahyaningsih, 2018). Student worksheets are one of the learning tools that present material and questions that aim to direct students to understand learning optimally (Maimunah et al., 2019; Rewatus et al., 2020).

Second, the guided inquiry-based Interactive E-LKPD on science content is feasible because it is very easy to use. The Student Worksheet is developed systematically, practically, and simply so that students have no difficulty using it (Marshel & Ratnawulan, 2020). Previous research findings also stated that the Student Worksheet that was developed systematically would make learning easier for students. Other studies also state that digital-based Student Worksheets are very practical because they can be accessed via mobile phones or laptops (Putra & Agustiana, 2021; Putra et al., 2021). Interactive E-LKPD learning tools are designed as attractive

as possible with writing and color images to attract reading interest and make it easier for students to understand the material's content. In addition to attracting interest in reading, this Interactive E-LKPD learning tool is also designed so that students do not get bored easily when reading and understanding the material's content. Especially now that learning must be technology-based, learning activities become flexible (Attard & Holmes, 2020; Sert & Boynueğri, 2016; Yavuz et al., 2021). The advantage of this interactive E-LKPD learning tool is that it can be used in various situations through online and offline systems. Judging from the current conditions, schools are still not fully running normally due to the Covid-19 pandemic, which has not been resolved optimally, so students still spend more time studying at home than at school (Kadafi et al., 2021; Maulana, 2021; Yulia, 2020). It is a separate problem for parents who also have to guide their children in understanding the material provided by the teacher. This learning media is expected to solve these problems.

Third, the Interactive E-LKPD on science content is feasible because it combines guided inquiry-based methods that increase students' enthusiasm for learning and critical thinking skills. E-LKPD is a guide for student worksheets in electronic form that makes material, questions, and pictures interesting so that E-LKPD is more interesting when compared to Student Worksheets in general (Putra & Agustiana, 2021; Putra et al., 2021). In addition, the material presented in the E-LKPD is equipped with pictures and videos so that students understand the learning material more quickly. Learning media such as appropriate pictures will help students understand information more quickly (Amini & Suyadi, 2020; Mardati et al., 2015). In addition, using learning videos can also attract students' attention to learning and make it easier for students to learn (Cahyani & Jayanta, 2021; Mpungose, 2021). The use of Student Worksheets can improve student learning activities. Inquiry-based learning fully involves students' abilities to logically, systematically, and critically investigate problems so students can formulate their findings well (Kumala, 2015; Sari et al., 2020). This learning method emphasizes that the teacher will guide students in carrying out activities by providing problems and solving students independently so they can hone students' critical thinking in solving problems (Citrawathi et al., 2016; Kohar et al., 2017).

This finding is reinforced by previous research stating that the Student Worksheet makes learning easier for students (Indrianingrum et al., 2018; Marshel & Ratnawulan, 2020; Nuswowati et al., 2020). Other research findings also say that E-LKPD increases students' enthusiasm for learning because it is practical (Yuliani et al., 2018; Yustina & Kapsin, 2017). Other research also states that guided inquiry-based methods can improve student learning outcomes (Nurhabibah et al., 2018; Sakdiah et al., 2018). The discussion shows that guided inquiry-based Interactive E-LKPD on science content is necessary for learning. The advantage of this research is that it will develop an E-LKPD equipped with image facilities that will make it easier for students to understand the material. In addition, E-LKPD is also based on guided inquiry which will improve students' critical thinking skills. This research implies that teachers can use guided inquiry-based interactive E-LKPD in the learning process. The limitation of this research is that it is only up to the validity stage but is still feasible to use in learning because it gets very good qualifications. The contribution of this research is that E-LKPD is also based on guided inquiry which can be used by teachers in learning to help students in learning science.

#### 4. CONCLUSION

Guided inquiry-based Interactive E-LKPD on the science content of various material styles and their use has received very good qualifications from experts, teachers, and students. It was concluded that the guided inquiry-based Interactive E-LKPD on the science content of materials of various styles and their use was appropriate for use in the learning process. Guided inquiry-based interactive e-LKPD on the content of science material, various styles, and their uses can help students understand science material.

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