Development of distance learning devices based on the elicit, confront, identify, resolve, reinforce (ECIRR) model on Newton’s law material

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Abstract. The Outbreak COVID 19 that struck all parts of the country made the government implement several policies to stop the spread of the epidemic, including learning activities carried out at home with online systems or distance learning. This study aims to develop teaching materials based on the ECIRR learning model in distance learning which is being applied by all schools due to the pandemic that is sweeping across the globe. The learning model applied has five steps, namely Elicit, Confront, Identify, Resolve, Reinforce. This type of research is R n D (research and development) research with the ADDIE research model with five steps, namely analysis, design, development, implementation, and evaluation. In this study only at the stage fourth, namely implementation. The material in this study, namely Newton's Law material held at SMKN 53 Jakarta. This is done because based on the results of the analysis of the needs of students at SMK 53 Jakarta, 53% of students feel they don’t understand Newton's Law concept properly. The results of the study this, namely the results of the analysis of the validation of material experts obtained an average percentage of 81% in the very high category, the results of the analysis of learning experts obtained an average percentage of 83% with a very high category, the results of the analysis of the media expert obtained a percentage of 96% with a very high, the results of the teacher validation analysis obtained an average percentage of 84% with a very high category.

1. Introduction
1.1. Background
The spread of the outbreak Covid-19 in Wuhan reported 90,870 confirmation cases in 72 countries including Indonesia. This epidemic is worldwide and many fatalities have occurred due to this epidemic, finally, the government issued a Minister of Education and Culture's mode (in the network) is one of the modes of learning that is applied to education Indonesian, this mode allows learning by utilizing the internet network, and this mode demands to learn by creating knowledge independently [1]. Students will work more independently which is the advantage of getting new skills [2]. This online learning can also improve the performance of students [3]. Therefore, preparation in online learning or distance learning is very necessary so that students can continue to understand learning well, therefore researchers analyze the needs of 3 educators and 35 learners.

Based on the analysis of student needs, the results show that students who feel they do not understand Newton's Law material as much as 53.2%, the availability of this material learning device
is only 45.6% as well as the availability of distance learning. Learners also feel the need for distance learning devices on Newton's Law material at 89.2% and based on an analysis of teacher needs, at 88%. This can be seen from the diagram in figure 1 and figure 2.

**Figure 1.** The need for distance learning devices with Newton's Law material in the analysis of student needs

**Figure 2.** The need for distance learning devices with Newton's Law material on the analysis of teacher needs

The results of the needs analysis are the basis for the development of this study. Used ECIRR instructional model in this study was based on the results of the analysis of the needs of teachers who feel teachers are not yet using appropriate learning models proved to be only 47% use ECIRR learning model. This can be seen in the pie chart in figure 3.
In addition to this, there are relevant studies that serve as reinforcement in this research including research on the use of distance learning devices using Edmodo can improve communication with students [4]. In the research of Agus Pahrudin and colleagues, it was found that the ECIRR learning model can increase student motivation [5]. This is very beneficial for students when learning distance so that motivation continues to grow. In Pratiwi’s research, the results show that the ECIRR learning model with virtual simulation media can significantly reduce misunderstandings, overcoming misconceptions effectively requires more than just raising, confronting, and resolving wrong ideas, and explanations and reminders reinforce learning and are important for the habit-solving process. [6]. Based on it, the research has taken, "Development of Distance Learning Devices Based on the ECIRR Model on Newton's Law Material".

1.2. Literature Review
1.2.1. Research and Development
This type of research is research development or commonly referred to research R n D (Research and Development) is the process of studies examining user needs and then developed products to meet those needs [7]. The development model used is ADDIE which has five steps, namely: analyzing, design, development, implementation, and evaluation [8]. This model is a process design iterative instructional, where evaluation results at each stage or phase bring the instructional design to the previous phase [9].

1.2.2. ECIRR
The analysis phase is in the form of needs analysis and target analysis [10]. At the design stage, namely setting goals, determining learning activities, subject matter [11]. At the development stage, which is to make and build based on the previous phase. In the implementation phase, which is implementing and conducting field trials. In the evaluation phase, namely evaluating the effectiveness of learning activities, investigating learning objectives, the impact of teaching and learning, and identifying changes [12]. The learning model used in this study, the model of learning ECIRR with five stages, namely Elicit by putting forward Wenning five steps, namely Elicit, Confront, Identify, Resolve, Reinforce.
In stage Elicit, educators investigate alternative conceptions through questions, dialogues, or asking students to explain physical phenomena. In the stage Confront, educators display physical phenomena then allow students to compare concepts. At the stage Identify, educators make students aware of concepts related to concepts. In the stage Resolve, educators provide the correct concepts. At this Reinforce stage, the educator must provide reinforcement repeatedly, which can be a way to give the question in the form of the conceptually [13]. Newton's law material refers to the SMK syllabus with basic competencies 3.3 analyzing motion and force using Newton's laws and 4.3 using simple tools related to Newton's laws of motion. This material is one of the materials that are difficult to understand for students[14]. Learners do not understand the concepts and mathematical equations used [15].

2. Research Method
The model development of this research, which is ADDIE with the following steps:
   a. **Analysis** (Analysis)  
      At this stage, an analysis of the need to give a questionnaire prepared by the google form that was distributed to educators at SMK 53 Jakarta and 35 learners.
   b. **Design** (Design)  
      At this stage, relevant material is prepared, the learning model, the media used. Based on the results of the needs analysis, the researchers conducted the development of distance learning by using the Edmodo application which contains practicum videos, worksheets, handouts, and some design learning (RPP) with the ECIRR learning model.
   c. **Development** (Development)  
      At this stage, do product development.
   d. **Implementation** (Implementation)  
      At this stage, the research conducted at the school SMK 53 Jakarta in June 2020.
   e. **Evaluation** (Evaluation)  
      At this stage, do appraisals for improvement. However, the research was carried out only to the stage implementation.

3. Result and Discussion
The product in this study was in the form of distance learning using the Edmodo application that was easily accessed by students. The following is the appearance of Edmodo.
Figure 4. Classroom front view in Application

Figure 5. Display of Edmodo Application learning
Edmodo learning applications are used in distance learning, because the features in this application support the current conditions. There are also learning tools such as lesson plan, student worksheet, and handouts. Following is the display of the device.

**RENCANA PELAKSANAAN PEMBELAJARAN (RPP)**

| Satuan Pendidikan | : SMKN 33 Jakarta |
|-------------------|-------------------|
| Mata Pelajaran    | : Fisika          |
| Kelas / Semester  | : X TKJ/Geatri    |
| Topik             | : Hukum Newton    |
| Materi Pokok      | : Macam-macam Gaya|
| Alokasi Waktu     | : 2 x 45 menit    |

A. Kompetensi Dasar

3.3 Menganalisis gerak dan gaya dengan menggunakan hukum-hukum Newton

4.3 Menggunakan alat-alat sederhana yang bekerja dengan hukum Newton tentang gerak

B. Tujuan Pembelajaran

Setelah memanfaatkan pembelajaran jarak jauh dengan model pembelajaran ECIR, diharapkan peserta didik dapat memahami gaya-gaya yang bekerja pada suatu benda dan mengenal konsep dari hukum 1 Newton serta menemui sikap disiplin, benar dan jujur.

C. Kegiatan Pembelajaran

1. Pendahuluan
   a. Peserta didik diminta pendidik untuk masuk ke zoom
   b. Peserta didik membaca doa dan diajarkan oleh pendidik
   c. Peserta didik mendengarkan tatapan pembelajaran hukum 1 Newton yang diajukan oleh pendidik
   d. Peserta didik mendengarkan motivasi yang diberikan pendidik
   e. Minta peserta didik untuk gabung melalui Edmodo dengan link: https://www.edmodo.com/groups/fisika-35455619

2. Kegiatan inti
   a. Bicara

**Figure 6. Lesson Plan Display**

This distance learning lesson plan is used so that learning becomes directed.
Student worksheets are used as a means of learning and assisting students in thinking processes. The results of the validation analysis material are shown in the tables below:
Table 1. Results of Expert Validation Analysis Material

| Indicators                                                                 | Validators 1 | Validators 2 |
|----------------------------------------------------------------------------|--------------|--------------|
| Appropriate images and formula equations to increase understanding students | 75%          | 80%          |
| Presentation of media to increase students understanding                    | 80%          | 90%          |
| Explanation of material that is easily understood by students               | 80%          | 80%          |
| Preparation of RPP for learning Newton’s Law                                | 84%          | 76%          |
| Average Results                                                            | 81%          |              |

Figure 9. Graph of Expert Validation Analysis Material

Validation material is divided into four indicators, each indicator is displayed in the form of a percentage which is represented in the form of a graphical table as shown above.

The results of the validation analysis material are shown in the tables below

Table 2. Results of Validation Analysis of Learning Experts

| Indicator                                                                 | Validator 1 | Validator 2 |
|--------------------------------------------------------------------------|--------------|--------------|
| The explanation can help students learn independently                    | 80%          | 88%          |
| Suitability of instruction                                               | 76%          | 88%          |
| Increase motivation learners on the concepts presented                    | 85%          | 80%          |
| Practice questions provided on learning                                  | 80 %         | 87%          |
| Average Result                                                            |              | 83%          |
Validity of learning is divided into four indicators, each indicator is displayed in the form of a percentage which is represented in the form of a graphical table as shown above. Validation was carried out by two validators with an average result of 83%.

| Indicators                          | Validator 1 | Validator 2 |
|------------------------------------|-------------|-------------|
| Display on media                   | 85%         | 100%        |
| Use of good language on media      | 80%         | 100%        |
| Ease of media use                  | 76%         | 100%        |
| Quality of supporting media        | 80%         | 83%         |
| Average Results                    | 96%         |             |

**Table 3. Results of Media Expert Validation Analysis**

![Analysis Graph of Media Expert Validation](image)

*Figure 11. Validation Analysis Graph Media Expert*
### Table 4. Results of Teacher Validation Analysis

| Indicators                                    | Validator 1 |
|-----------------------------------------------|-------------|
| Appropriateness of Lesson Plan components     | 90%         |
| Learning systematically displayed             | 80%         |
| Eligibility for good language                 | 80%         |
| Feasibility of media use                      | 87%         |
| Average Result                                | 84%         |

The teacher’s validation analysis graph

![The teacher’s validation analysis graph](image)

Figure 12. Analysis of Teacher Validation Analysis

Based on the analysis results, the one with the highest percentage is in media validation, teacher learning, and material.

### 4. Conclusions

The results of the analysis of the validation of material experts obtained an average percentage of 81% in the very high category, the results of the analysis of the learning expert obtained an average percentage of 83% with a very high category, the results of the analysis of the media expert obtained a percentage of 96% with category very high, the results of the validation analysis the average teacher percentage is 84% with a very high category.

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