Evaluation of Blended Learning Program Physics of Mechanical Wave Materials Using CSE-UCLA Model

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Abstract. This study aims to obtain an overview of the blended learning program for physics subjects in mechanical wave material during the covid-19 pandemic, and to find out the supporting factors and obstacles so that they can be projected into solutions that are adaptive to the needs, availability and skills of students. The research method used is qualitative with an evaluative approach to the CSE-UCLA model. The subjects of this study were students of class XI IPA-1 and XI IPA-2, totaling 64 people at SMA Negeri 1 Timpah, Timpah Village, Central Kalimantan, Indonesia. Data were collected through questionnaires, interviews, observation and documentation. The data analysis procedure used Milles & Hubberman model analysis, including data reduction, data presentation, and drawing conclusions. Furthermore, the data and research findings were triangulated to check the validity of the data. The results of the program evaluation research from system assessment components, program planning, program implementation, improvement programs, and certification programs overall show that the physics blended learning program at SMA Negeri 1 Timpah supports the government's policy in responding to the COVID-19 outbreak to learn from home, which is relevant to the supporting factors and obstacles.

1. Introduction
The detection of the Coronavirus or covid-19 in the city of Wuhan, China, which then spread to all countries until it entered Indonesia, also had an impact on education. New coronavirus pneumonia in Wuhan triggered by covid-19 is now spreading all over the world [1]. Due to the highly contagious nature of this virus, social distancing and restrictions have become unavoidable to prevent its rapid spread in the community [2]. The pandemic has made education providers decide to expand education virtualization to conduct online exams and all learning were carried out remotely [3]. Changes in learning patterns are expected to continue to be carried out optimally, for that an evaluation of learning programs can be carried out. Program evaluation aims to determine the achievement of program objectives that have been implemented [4]. Evaluation is very necessary in learning and will determine the success of an organization [5]. Through learning evaluation, educational institutions can determine students' knowledge abilities and competencies based on students' test scores [6].

In principle, evaluation is an activity carried out by evaluators to collect, analyze, and present complete and accurate information about an object / program / service / policy being studied [7]. Model Center for the Study of Evaluation – University of California in Los Angeles (CSE-UCLA) is an evaluation model developed by Alkin which consists of five evaluation components, namely: system assessment, program planning, program implementation, program improvement, and program certification, then this evaluation model is appropriate and suitable to be used to evaluate programs / policies in education and other fields related to service programs that help human life [7].
evaluation of the CSE-UCLA model has been used in research showing that this evaluation model can be used to evaluate educational services either manually or electronically, namely the Alkin model (or often called the CSE-UCLA model) [8]. Designing an evaluation using the CSE-UCLA model was also carried out by Atmaja, Divayana and Seteman in the research of the Regional Archives and Library Office of Badung Regency to be able to recommend aspects of services that need to be optimized [9]. However, how to effectively evaluate blended learning has not yet formed a mature theory [10].

Weaknesses and advantages of face-to-face learning and web-based learning can be covered with each other by designing for the activities of both, this kind of learning is called blended learning [11]. Blended learning is a learning strategy that integrates face-to-face learning and online learning with a combination of various media [12]. Blended learning has significantly empowered learners and expanded their repertoire of learning experiences [13]. Mixed learning effectively expands learning time, and also expands learning content, giving students more opportunities for independent study and self-expression, and their evaluation is more comprehensive and scientific [14]. However, blended learning designs need to be considered, especially when and what types of learning materials should be delivered online and offline [15].

The material chosen in the evaluation research of this blended learning program is class XI mechanical wave material which is the basic material of waves so that it is considered suitable to be evaluated as an introduction to student knowledge to make it easier for students to follow the next wave of material. One of the main subjects of physics is waves [16]. Students have a false intuition about the relationship between amplitude and frequency, and students have difficulty representing a graph of displacement against time [17]. Research on mechanical waves has been carried out by Afrizon, Dewi, and Dwirida to analyze the physical parameters of Minangkabau aerophone musical instruments as a meaningful learning context [18] stating that Minangkabau musical instruments are one of the tangible local wisdom related to the material. Physics for class XI high school students, namely sound waves as part of mechanical waves. Research on waves was also carried out by Jahirwan Ut Jasron, Sudjito Soeparman, Lilis Yuliati, Djarot B. Darmadi on the characteristics of waves that determine water fluctuations in the water column [19] stating that the steepness of the waves is different, the wave energy also changes. Gallardo Pérez, M Vergel Ortega, and Rojas Suárez have also conducted research for learning on the concept of waves stating that studying the concept of waves sequentially leads students to construct knowledge for use in context, to develop effective reasoning processes, to develop self-directed learning skills and to motivates students to learn, along with developing the capacity to work in teams and supporting the development of physical-mathematical thinking [20].

The originality of this research is the evaluation of blended learning Physics of mechanical wave material for students in areas that are constrained by network and internet signals, namely at Senior High School or SMA Negeri 1 Timpah, Timpah District, Kapuas Regency, Central Kalimantan. This school is situated on Palangka Raya-Buntok Causeway, but electric lighting cannot be enjoyed at night from 16.00-06.00 West Indonesia Time (WIB). During the COVID-19 pandemic, SMA Negeri 1 Timpah implemented a blended learning policy with Learning From Home in accordance with the instructions of the Central Kalimantan Provincial Education Office and while still allowing face-to-face learning to schools according to the needs of teachers and students by alternating between class and still adhere to health protocols. Input from students in this school is not only from the Timpah Junior High School, but also from the One Roof Junior High School in the village which is still separated by forest or community rubber plantations. Student knowledge is built by the student's own experience through a construction process obtained through interaction with objects, phenomena, sources of accurate information and the student's environment [17]. The novelty of this research is the evaluation of blended learning Physics of mechanical wave material using the CSE-UCLE model at SMA Negeri 1 Timpah which has never been evaluated for the mixed learning program that is being implemented in response to the COVID-19 pandemic. The availability of facilities and infrastructure, the distance students travel from home to school and including internet facilities, especially in schools in rural areas need to find solutions or alternative learning activities. The availability of facilities and infrastructure, the distance students travel from home to school and including internet facilities,
especially in schools in rural areas need to find solutions or alternative learning activities. Quality education will not be implemented if there are no adequate supporting facilities and infrastructure [7]. The progress of student learning outcomes must be evaluated and monitored [6].

Many educational institutions have opened online classrooms and advocate blended learning models that combine traditional learning methods with computer-assisted learning, but the educational evaluation system and appropriate examination methods have not undergone appropriate reforms [10]. Thus, the formulation of the research problem is: 1) How is the evaluation of the physics blended learning program for wave mechanics using the CSE-UCLA model at SMA Negeri 1 Timpah? 2) What are the supporting factors and obstacles in implementing the evaluation of the physics blended learning program for wave mechanics using the CSE-UCLA model at SMA Negeri 1 Timpah? So the purpose of this study was to determine the evaluation of the blended learning program for physics subjects on wave mechanics and to find out the supporting factors and obstacles to implementing the program using the CSE-UCLA model at SMA Negeri 1 Timpah.

2. Method
This research method is a qualitative research with an evaluative approach using the CSE-UCLA model. The object of this research is blended learning physics of mechanical wave material. While the subjects of this study were 64 students in the second semester of the 2020/2021 academic year, including 32 students in class XI IPA-1, and class XI IPA-2 32 people, at SMA Negeri 1 Timpah, Village / District Timpah, Kapuas Regency, Central Kalimantan, Indonesia. This study involved the principal, 1 physics teacher, 1 chair of the Physics Subject Teacher Consultation (MGMP) in Kapuas Regency and 3 members.

Figure 1. Evaluation of physics blended learning program using the CSE-UCLA model.

Figure 1 above is a series of data collection techniques carried out by observation, interviews, questionnaires and documentation. The results of the analysis are not expressed in numbers but are expressed in the form of words and pictures. The data analysis procedure during the data collection process and after data collection uses a model of qualitative data analysis, namely the Milles & Hubberman model [21], where the activities in this analysis are carried out interactively and last to completion with steps consisting of: data reduction, data display, and conclusion. Then triangulation was carried out for the validity of the data. The data obtained is then organized and tabulated, so that it can be used to compile the necessary evaluation aspects with the CSE-UCLA model [9].

3. Result and Discussion
Based on the research objectives, to determine the implementation of the evaluation of the blended learning program for physics subjects on the wave mechanics material and to determine the supporting
factors and their implementation at SMA Negeri 1 Timpah. To achieve this goal, an evaluation instrument using the CSE-UCLA model is used which is described as follows:

3.1. Evaluation of the physics blended learning program for wave mechanics

It is important to evaluate learning to take advantage of each learning objective [22] (Bohori & et al., 2020). In general, the evaluation of the program in blended learning physics of wave mechanics is carried out to find out how prepared, planning, results, and useful it is at SMA Negeri 1 Timpah, in terms of aspects of the CSE-UCLA component model 5.

The System Assessment component of the physics blended learning program as a school policy during the COVID-19 outbreak was carried out by giving questionnaires to teachers, students and interviews with school principals. The results of the assessment of disclosing teacher needs on aspects of: 1) Blended learning interaction tools, 2) Appropriateness of the device, 3) Synchronous and foreign devices, 4) Learning skills 5) Evaluation needs, it was found that 8 out of 12 statements were yes. The results of the assessment of the disclosure of student needs showed that 12 of the 13 statements were yes. The results of the assessment of the principal on the disclosure of school resources, found that 17 of the 20 statements provided information that supported the implementation of the physics blended learning program. This means that the results of the overall assessment state that the blended learning physics program can be applied to support teaching and learning activities that are currently being enforced by social restrictions and Learning From Home. While being given a statement that the answer is no is an obstacle in the blended learning program. So it is necessary to combine e-learning and conventional learning in a class called the blended learning model which is suitable to be applied at the high school level, because the character of competent students still needs assistance as students [12]. Thus, the physics blended learning program at SMA Negeri 1 Timpah is declared to be applicable to support the Central Kalimantan Regional Education Office's policy program regarding studying from home during the recovery from the COVID-19 outbreak. This is a way to meet the needs of teachers, students with limited school resources, blended learning can be the right choice with the use of useful technology in education and web-based learning helps teachers and students organize learning without having to meet face to face [11].

The Planning Program component begins with compiling a physics blended learning device for mechanical wave materials, then evaluated by an evaluator consisting of 1 physics teacher and 4 Physics MGMP members. Basic Competence (KD): 3.8 Analyzing the characteristics of mechanical waves. 4.8 Propose problem solving ideas about mechanical wave characteristics, for example on a rope [23]. In addition, the wavelength increases with the increase in the wave period, and vice versa, the wave height decreases with the increase in the wave period [19]. All of these waves have two main characteristics: They are governed by Newton's laws, and they can only exist in material media, such as water, air, and rock [16]. Evaluation of aspects of this planning program includes: Design of Learning Implementation (RPP), preparation of materials, preparation of exercises, preparation of assignments, and the completion of the assessment rubric. The results of the evaluation showed that 4 evaluators said it was good, and 1 evaluator said it was very good, meaning that the physics blended learning device planning program is appropriate and very suitable to be applied. And all the evaluators gave the same conclusion that the blended learning program for physics of mechanical wave material is valid, meaning that the design of synchronous and asynchronous learning devices and platforms is feasible to apply. Blended learning consists of online learning components and face-to-face learning components so that the application of these two learning components needs to be considered in these two components in accordance with the learning competency targets [12].

Program Implementation components are carried out in: 1) Synchronous through face-to-face in class, Phet simulation and through the zoom meeting application; 2) Aisongkronos via WhatsApp and google classroom. The wave motion can be learned from the autonomous work done by the student because it is a process in which he can appreciate and understand how the energy is transmitted from one part to another without the transfer of matter [20]. Evaluation standards are determined by teachers because it is difficult to have uniform and specific specifications [10]. Evaluation of measurement aspects, namely: 1) Students' basic abilities in the physics subject of wave mechanics through a pretest; 2) Participation in student learning through attendance, training and task fulfillment;
3) Representation of Students’ theoretical/mathematical abilities through posttest. The results of student learning measurements refer to the Minimum Completeness Criteria (KKM) for Physics at SMA Negeri 1 Timpah, which is 70 with the predicate:

Value $< 70 = $ Less (D), $70 \leq $ Score $< 80 = $ Enough (C), $80 \leq $ Score $< 90 = $ Good (B), $Score \geq 90 = $ Very Good (A). The results of the evaluation of program implementation vary for each student and in the aspect of the assessment, namely quite good, good, and very good. This means that blended learning physics is carried out according to program planning and student learning needs, but must pay attention to implementation constraints. Thus, the conclusion of the validator is valid. This means that the implementation of the program has been able to describe the process of learning activities. This illustrates that teachers can combine face-to-face learning strategies with e-learning-based learning strategies [24].

Program Improvement component, processing the collected data and evaluated by the same validator. The evaluation results showed that all 5 evaluators said they were good. At the conclusion, 4 validators stated that the improvement program was valid, and 1 validator stated that it was valid with improvements to the parts that became obstacles. This means that the physics blended learning program can be applied to measure student learning abilities. It is necessary to record the entire student learning process dynamically [14]. Thus, the overall data projection of each component and its aspect is valid. This means that all the data collected can describe the ongoing program evaluation. The blended learning model is a solution to the limited hours of lessons a teacher has by placing student involvement in a learning agenda that focuses on students or Student Centered Learning [12].

Certification Program Component, by a validator consisting of the principal, physics subject teacher, and the head of the Physics MGMP. In the aspect of data correctness, program relevance, consistency, objectivity on student involvement, documented, measurable, interrelated data results are obtained for projecting research results on the function of the program evaluation process. The results of the evaluation of the certification program components are valid, meaning that all data used can be projected and meet all aspects of data validity. In general, evaluation can be interpreted as an activity of collecting, analyzing, and presenting related information about a certain object / program / policy / service based on measurements using an appropriate evaluation model and appropriate and valid evaluation instruments so that the results can be used as recommendations in making decisions [7]. So, in general, the preparation, planning, process, results, and benefits are valid. This means that all instrument data used can be projected systematically and interrelated. The implementation of blended learning is a systematic project, which needs to start from determining teaching goals, designing teaching links, building online platforms, teaching guides in the classroom, and evaluating [14]. So it can be concluded that the physics blended learning program at SMA Negeri 1 Timpah supports the policy of learning from home.

3.2. Supporting factors and obstacles to the implementation of program evaluation

Evaluation is useful in identifying the supporting factors or obstacles found in the physics blended learning program for wave mechanics at SMA Negeri 1 Timpah. This evaluation uses the CSE-UCLA evaluation model, as an effort to maximize the potential and minimize the obstacles to present a feasible solution.

The System Assessment component, the physics teacher explained that the supporting factor was smooth teacher and student communication, while the obstacles were that not all students had laptops, lack of understanding of laptop use, and unstable internet networks, so that they became obstacles in implementing virtual applications. The principal explained that the supporting factors were the attention of the government, school committees and parents, while the obstacles were learning materials and physics books that still needed to be completed. Instructional approaches and strategies that enable students to communicate, collaborate, and explore beyond the knowledge transferable by books and teachers, which are not strictly traditional teaching where the only available resources are teachers, books, and whiteboards, is an application of blended learning [13]. So, responding to it is to maintain smooth communication by constantly coordinating and sharing information related to education or learning from and to all related parties, both the Central Kalimantan provincial education office government, schools, teachers, school committees, parents, and students, and with identify
material that can be delivered synchronously or asynchronously so that learning can be carried out. Education-related parties should develop a new performance evaluation system suitable for mixed learning to identify and measure the actual level of student learning and promote overall student development [10].

The program planning component, the physics teacher explained that the supporting factor was that the blended learning program had been running in schools, while the obstacle was the lack of student discipline in collecting assignments. Through social networks can improve interpersonal relationships and facilitate communication [24]. The principal explained that the supporting factor is good and smooth communication between schools, teachers, students, parents and school committees, while the problem is that not all learning materials are available. So, responding to it is to design a blended learning device that simultaneously fosters student discipline and contains practical learning materials such as embedding a short video about a material for students to analyze according to learning objectives. It is necessary to record the entire student learning process dynamically [14].

The program implementation component, the physics teacher explained that the supporting factors were that they had provided additional material from links or other references, and had used synchronous and asynchronous learning applications, while the obstacle was learning applications that could not be applied optimally. Science process skills as basic competencies in understanding physics [22]. The principal explained that the supporting factor was adequate classrooms according to the size of the national standard, while the problem was the need to add physics books. Thus, responding to it is to arrange synchronous and asynchronous meetings by paying attention to learning needs and problems. Asynchronous is carried out in a virtual laboratory or embedding a link on how to use the tool. In sync, recorded and embedded in learning applications so that students who do not understand or miss can repeat again. If the mixture is too simple then the meaning of mixed learning is lost and the ideal teaching effect cannot be achieved and if the mixture is too complex then it is difficult to promote teaching activities, so integrated learning should focus on teaching objectives, design teaching, continue to deepen, and advance step by step [14].

The improvement program component, the physics teacher explained that the supporting factor was to anticipate the use of simple practical tools, such as Figure 2(a). Students’ comments on Google Classroom are as shown in Figure 2(b), it is known that students’ physics learning problems are difficult to focus, difficult to remember theory, unstable network and difficulty understanding concepts and formulas, such as the relationship between period and wave frequency expressed as $T = \frac{1}{f}$ or $f = \frac{1}{T}$ [25]. The principal explained that the supporting factor was the presence of 2 physics teachers, while the obstacle was the standard student’s physics ability.

Students cannot do physics learning well without mastering good process skills [22]. So, responding to it is by adapting learning so that students can follow it without reducing the content of
the material. Meaningful learning, namely learning is an experiential process because it is related to the natural context and the ability to adapt to the surrounding environment [18].

The component of the certification program, the physics teacher was found to explain the supporting factor was the evaluation of the program to get a picture of the success of blended learning physics. Compared to the simple assessment model of traditional teaching-testing, mixed learning evaluation is more comprehensive, systematic and scientific [14]. The principal explained that the supporting factors for the program are that every year students are entered in science competitions and there is an evaluation of grade promotion. So, responding to it is by evaluating the program to get a picture of students' physics abilities and the success of blended learning physics. This takes into account the academic culture of the school, where the use of computers and other devices is sought to be used massively and extensively in the teaching and learning process [13].

So the evaluation of the program obtained can be stated that blended learning is relevant to the supporting factors and existing obstacles to support learning from home and as a solution to the policies implemented during the current covid-19 pandemic. Advantages of blended learning [14]: 1) Integrated learning is conducive to increasing students' autonomous learning; 2) Mixed learning content is more targeted; 3) Evaluation of mixed learning is more scientific. So that the benefits that can be obtained from the benefits of blended learning for educational or training institutions are in the form of: expanding the range of learning/training, ease of implementation, efficiency, optimal results, adapting various student needs, and increasing the attractiveness of learning.

4. Conclusion
Based on the results of the evaluation of the CSE-UCLA model in general, each aspect is declared good, which describes the implementation of the program in each of its components saying that the component system assessment is valid, program planning is valid, program implementation is valid, program improvement is valid, and program certification is valid. This means that the physics blended learning program at SMA Negeri 1 Timpah has supported the Central Kalimantan Education Office Government Policy regarding learning from home for the COVID-19 outbreak and its recovery period. The blended learning program also cannot be separated from the supporting factors and constraints that are relevant as its implementation, namely smooth communication, fostering student discipline, students can repeat their learning, adaptation of learning media and programs. This study offers blended learning in physics subjects, which still have problems, only learning from home or conventional learning.

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