



Validity of Guided Discovery Learning-Based Content Learning System to Improve Learning Outcomes in Acid-Base Materials

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Abstract. This study aims to develop a learning media based on guided discovery learning on acid-base material to improve the learning outcomes of 11th-grade Senior High School students. ADDIE is used for R&D. Questionnaires and validation sheets provided the data. 3 Padang State University chemistry lecturers and 3 high school chemistry teachers validated this content learning system. Using Aiken V, validation data is analyzed. Based on data analysis, the developed content learning system had a kappa of 0.85. From these results, it can be concluded that the developed content learning system is valid and can be used to learn acid-base.

Keywords: Content learning system · guided discovery · acid-base · Aiken V

1 Introduction

Learning media is a means of communication channels, media comes from Latin which means intermediary between the sender and receiver of the message. Media is a component of various types of student environments that can stimulate learning. Learning media are Used to convey messages and stimulate students' thoughts, feelings, attention, and desires for a controlled learning process. Learning media can be printed, audiovisual, or ICT-based. Learning media is important because learning is a system-wide communication process. Learning media are an integral part of the educational system.

Media is a facility and infrastructure that can help to learn whose function is to facilitate the implementation of Learning Implementation Activities (KBM) and help students to capture the content and skills taught. The use of information technology by using media in learning makes learning more interesting, creative, active, and effective. The objectives in the implementation of effective learning as contained in the content of the Regulation of the Minister of Education and Culture No. 65 of 2013 concerning the use of information technology can increase the efficiency and effectiveness of learning. One of the efforts in generating student motivation is the use of more interesting learning media that the possibility of students to learn independently according to their abilities and interests (Arsyad, 2013). Therefore, in learning, creative, interesting, and practical learning media are needed so that they can attract students' enthusiasm for learning.

ICT, especially, plays an important role in learning. Many believe multimedia will replace “learning with effort” with “learning with fun.” E-learning is a learning model supported by ICT. Rusman et al. (2011: 264) say e-learning is interactive, independent, accessible, and enriching.

(Seok 2008:725) “E-learning is a 21st-century pedagogy. E-Teachers are instructional designers, interaction facilitators, and content experts “less Using a Learning Management System module like Moodle makes e-learning for online learning easy. Moodle, an LMS (LMS) has been widely used in schools and universities as a support for teaching and learning activities. In addition to acting as a means of communication between teachers and students, Moodle also functions as a storage place for various reading resources or other materials related to teaching materials such as journals or scientific articles. Moodle is one of the Distance-learning CMS (eLearning). CMS (Content Management System) helps manage and publish content (collaborative content management). Content refers to text, graphics, images, and other formats that must be managed to facilitate creation, updating, distribution, searching, analyzing, and transformation. CMS can manage application software, databases, archives, workflows, and other tools as part of a company’s global information network.

Moodle, an e-Learning CMS (Content Management System) or Virtual Learning Environment (VLE). Modular OODE (MOODLE). MOODLE’s provider includes MOODLE, Apache, MySQL, and PHP. The LMS Moodle (LMS) application that can be freely downloaded, used, or modified by anyone with a General Public License license, can be downloaded at the address of <http://www.moodle.org>. Which was developed by Martin Dougiamas. Currently, Moodle is already used in more than 150,000 institutions in more than 160 countries of the world.

Teachers as facilitators have a role in developing the potential of students. Teachers can apply the learning model suggested by the 2013 curriculum that is in accordance with the scientific approach, so as to be able to develop potential and understanding of concepts and learning outcomes of students. One of the learning models. The guided discovery learning model is designed to increase the activeness of students, be more process-oriented, and find their own information in achieving learning goals, and educators only act as facilitators in learning activities (Yuliani & Suragih, 2015). The guided discovery learning model is more effective and efficient and practically applied in the learning process in the classroom. This is because teachers not only deliver learning but students must also be required or motivated to build and find for themselves the concepts and meanings of learning (Yerimadesi et al., 2019). Therefore, to support guided discovery learning-based learning, especially in elemental chemistry materials and the use of technological advances in learning and support online learning, it is necessary to have teaching materials that encourage student participation and improve the ability and understanding of students.

2 Research Methods

This research uses the ADDIE model to analyze, design, develop, implement, and evaluate. This ADDIE model is used for the development of media, teaching materials, learning models, and learning strategies.

The research procedure includes 1. Analysis stage, a. analysis of student character; the character of students in learning, using the internet, computers, and interest in the material to be presented, by distributing questionnaires to students. b. material analysis, analyzing the curriculum so that the material to be presented is in accordance with the learning objectives. c. media and technology analysis, analyzing the availability of supporting facilities and learning media in schools.

1. Design Stage, at this stage a development design is made that will be a reference in the development of learning media.
2. Development Stage, researchers carry out the manufacture of products which are then validated by material experts and media experts, then revised according to the validator's assessment.
3. Implementation Stage, which is the trial stage for small groups and large groups so that students and teachers' responses are obtained in the use of products that have been developed.
4. Evaluation stage, at this stage an evaluation is carried out whether the resulting product is appropriate and suitable for use in learning.

The type of research data is prior data because the data is obtained directly through the provision of validity test questionnaires and practicality tests on the test subjects, namely class XI science students of SMA N 14 Padang. The assessment given by the validator of each statement was analyzed using the formula of Aiken's V. The formula proposed by Aiken is as follows (Fig. 1):

$$V = \frac{\sum s}{n(c-1)}$$

Fig. 1. Formula V Aiken

Description: S = r-lo, lo = lowest validation assessment number, c = highest validation assessment number, R = number given by the appraiser, N = number of appraisers.

The level of validity of guided discovery learning-based student worksheets will be seen after being converted to categories in the Fig. 2:

Aiken V scale	Validity
V < 0.8	Invalid
V ≥ 0.8	Valid

Fig. 2. Validity Level

3 Results and Discussion

At the analysis stage, information was collected about the obstacles and problems contained in the chemistry learning process in schools during the COVID-19 pandemic



Fig. 3. Cover Content Learning System

No.	Aspects	K	Categories
1	The notification display on moodle is clear and works fine	1.00	Valid
2	The features on moodle have recognizable symbols	0.83	Valid
3	Use of letters, numbers, and clear symbols	0.89	Valid
4	The visual quality of the graphics and images is good	0.83	Valid
5	The quality of the video presented on moodle is good	0.78	Valid
6	The sound quality presented on the moodle is clear and free of noise	0.83	Valid
7	The arrangement of the stages of the learning process is well organized and neat	0.83	Valid
	<i>Average</i>	0.86	Valid

Fig. 4. Result of The Validity of the Display Aspect

conditions which caused the learning process to be unable to be carried out as usual. From this analysis, it is necessary to develop a content learning system based on *guided discovery learning*. Then a material analysis and curriculum analysis are carried out to develop the product. At the design stage, a planning process for making a content learning system will be made. The content learning system developed consists of a cover, introduction, usage guide, attendance, competency achievement indicators, learning materials, videos, assignments, discussion forums, and exams/evaluations (Fig. 3).

The development stage is the stage where the product that has been produced will be tested by several validators to determine its validity and then a revision process is carried out. The validity test was carried out by 3 chemistry education lecturers at Padang State University and 3 chemistry subject teachers at SMA N 14 Padang. The purpose of the validity test is to test the level of validity of the content learning system based on guided discovery blended learning that has been developed. The assessment of the validity of e-learning media is divided into 2 aspects, namely the display aspect and the convenience aspect. The first aspect assessed from the e-learning media validity test is the display aspect. The results of the data analysis of the e-learning media validity test aspects of the display are shown in the Fig. 4.

From the results of the analysis of the e-learning media validity test data on the display aspect by 6 validators contained in the table, it shows that determine the feasibility of the e-learning display aspect, an Aiken v value of 0.86 was obtained, indicating that the average of these aspects was considered valid. The next aspect that is assessed from the validity test of e-learning media is the aspect of convenience. The results of the data analysis of the e-learning media validity test aspects of ease are shown in the Fig. 5.

No.	Category	Average (k)	Average of validity categories
1	Display Aspects	0.86	Valid
2	Aspects of Ease	0.83	Valid
	Average	0.85	Valid

Fig. 5. Average of Validity Categories

From the results of the analysis of e-learning media validity test data on the aspect of convenience by 6 validators contained in table, it shows that out of the 12 aspects assessed to determine the feasibility of the ease of e-learning aspect, an Aiken v value of 0.86 was obtained, which shows that the average of these aspects is considered valid. Based on the results of data analysis, aspects of the validity of e-learning media, namely aspects of appearance and convenience, a summary of the results of data analysis is shown in the Fig. 5.

From the results of the analysis of e-learning media validity test data by 6 validators contained in Table 6, it shows that from the aspects assessed to determine the feasibility of e-learning, an Aiken v value was obtained which shows that the average of this aspect is considered valid, namely 0.85. This shows that the content learning system developed is valid, the appearance of the content learning system is good, and there is the ease in using the content learning system.

The validity of the e-learning display aspect shows an Aiken V value of 0.86 with a valid category. This shows that the appearance of e-learning is in accordance with the e-learning development guidelines. The quality of images, animations, and videos is good and can be easily accessed by learners. In terms of color display, text and color quality are also appropriate. Then the validity of the aspect of the ease of showing Aiken's V value of 0.83 with a valid category. This shows that the e-learning developed has met the aspects of convenience so that it is easy for students to use. E-learning is said to be good to use if the performance on e-learning can be used easily and there is a hyperlink button provided. Although the validity of the *content learning system* based on *guided discovery learning* on the resulting acid-base material is valid, there are still some components that must be improved in accordance with the advice given by the validator. In accordance with the advice given by the validator, a revision of the *content learning system* will be made to be developed for further trial.

4 Conclusion

Guided discovery learning-based content learning system in acid-base has been able to be developed to have a very high level of validity. The product can be continued to be tested for practicality value. A content learning system based on guided discovery learning on acid-base material has been revised so as to produce a valid content learning system Boost student learning. Authors suggest: Teachers can teach with learning strategies learning becomes more interesting;

1. For teachers, it is hoped that they can make this guided discovery learning-based content learning system as an alternative teaching material used in learning acid-base material in schools.
2. For students to be able to take advantage of this guided discovery learning-based content learning system in finding acid-base material.

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