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ONLINE LEARNING DEVELOPMENT MODEL WITH AN INQUIRY APPROACH TO IMPROVE PHARMACY STUDENTS' SKILLS IN READING TEXT FOR HIGHER EDUCATION

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ABSTRACT

This research is an early stage that aims to develop an online learning model by utilizing an inquiry approach to help students of the pharmacy study program understand terms in the pharmaceutical field. This research uses the ADDIE R&D model which contains: analysis, design, development, implementation, and evaluation that have been carried out. The participants in this study were 40 students of the pharmacy study program from the Islamic University of Malang. The inquiry learning approach is carried out in four stages: orientation, exploration, and concept formation, application, and closing. The results of material expert validation obtained an average total of 94.7% with valid criteria, while validation by learning design experts obtained an average total of 88.78% with valid criteria without revision. Validation by learning practitioners resulted in a total average of 91.08% with valid criteria that did not require adjustment. The results of the calculation of the student's answer questionnaire in the large group resulted in a total average of 86.8% with valid criteria without revision. The results of the pre-test and post-test, the average value is only 62.5 and increased rapidly in the post-test, which is 89.55. The highest pre-test score was 74, while the highest post-test score was 88. The lowest pre-test score was 60, while the highest post-test score was 66. Furthermore, the number of students who achieved the minimum score in the pre-test was eight. (20%), and post-test were 36 students who passed the test (90%). Based on these findings, it can be concluded that the development of an online learning model with an inquiry approach can improve the reading ability and understanding of students of the pharmacy study program about pharmaceutical terms at the Islamic University of Malang.

Keywords: *Online Learning, Inquiry, Reading Skills, Pharmacy*

INTRODUCTION

The goal of 21st century education is to offer and equip students with the resources they need to succeed in school, work, and life where one approach for students to succeed is to master a variety of 21st-century life skills such as critical thinking, problem-solving, communication, creative thinking, collaboration, and media and information literacy (Trilling & Fadel, 2009; Herman et al., 2022). The participation and active role of students are needed in the learning process so that these activities are oriented toward student involvement (Remziye, Yeter, Sevgül, Zehra, & Meral, 2011). In other words, learning activities are carried out to support students in obtaining the various abilities needed (Girsang et al., 2025). The application of student-oriented learning can be used to instill and develop varied qualities and abilities in students, especially in learning activities in the classroom and outside the classroom (Llewellyn, 2013; Herman et al., 2022).

The COVID-19 pandemic (Corona Virus diseases-19), which has occurred in the last 2 years, has affected and affected all aspects of life such as only in the world of education so a policy from the government, namely the shift from the learning system to an online system, must be implemented (van Thao et al., 2021). Of course, it is not an easy thing for educators and students to do. Therefore, appropriate models and learning systems are needed to be applied to existing situations, so that students are encouraged to study harder and get the best learning outcomes (Trilling & Fadel, 2009; Judijanto et al., 2024). One of the learning systems that utilize technology to create an efficient classroom environment and a learning environment that is oriented towards learning achievement is known as blended learning which is a hybrid of synchronous and asynchronous methods (Chaeruman, 2019; Ansari et al., 2023; Widodo et al., 2024; Purba et al., 2025).

Permendikbud number 104 of 2013 has provided recommendations for learning models based on a scientific approach (scientific approach) including discovery learning, project-based learning, problem-based learning, and inquiry learning (Resmi et al., 2023). One of the learning models that supports the current situation is the inquiry learning model because inquiry learning is part of an inductive learning strategy, which is defined as learning that begins with a series of procedures to observe a particular object or problem, and then students examine the object or problem. to obtain the necessary facts, procedures, or concepts (Spronken-Smith, 2007). The inquiry learning model is an effective learning strategy because it encourages students to use learning resources and collaborate in groups (Aini et al., 2019; Silalahi et al., 2022). Students can improve their problem-solving and critical thinking skills by adopting the inquiry model (Aumi & Mawardi, 2021). Inquiry learning emphasizes the independence of students to seek and find information (Akkuzu & Uyulgan, 2017). The inquiry paradigm can inspire, teach, and invite students to think higher in order to identify concepts regardless of difficulties(Kardena & Mawardi, 2020).

Various advantages of the inquiry learning model have been proven by several researchers this learning model provides opportunities for students to think in order to get concepts independently from various problems. From the results of initial observations, the facts show that students of the pharmacy study program at the Islamic University of Malang have difficulty in reading comprehension skills related to pharmaceutical terms. This is because the terms used in pharmacy are special terms so they experience difficulties in their interpretation and implementation. Based on this paradigm, the inquiry learning model is the right and innovative solution because the inquiry learning model focuses on concepts independently of various problems so that it really helps students in problem solving (Danczak, Thompson, & Overton, 2020).

Learning media are tools or materials used to assist learning activities and achieve learning objectives (Holden & Westfall, 2010; Hanif et al., 2023; Lumbangaol et al., 2024; Sinaga et al., 2025). Learning Management System (LMS), a form of learning media support, can be used to support online learning activities. Gamification is a design strategy that incorporates gameplay elements into a non-game environment to increase user engagement. With the concept of gamification in media or teaching materials, of course, it is very useful and helps the individual (Hanus & Fox, 2015; Cahyani et al., 2025). Gamification applies game features to the real world or productive activities to encourage and engage users (Werbach & Hunter, 2012). An LMS provides courseware and online training programs that connect lecturers and students. LMS allows lecturers to develop e-learning content, deliver it to students, manage assignments or exams, and track their performance. From the explanation above, it can be concluded that the inquiry learning model approach with the development of gamification-based learning media that is integrated with LMS is a solution for students of the pharmacy study program at the Malang Islamic University campus who have difficulty in reading comprehension skills related to pharmaceutical terms. The development of gamification-based digital learning media that is integrated with LMS with an inquiry learning model approach is expected to be a solution in improving the quality of learning, especially during the current and post-pandemic times.

METHOD

The purpose of development research using the ADDIE model, which includes five activities of Analysis, Design, Development, Implementation, and Evaluation, has been applied to this Research and Development (R&D) research process (Branch & Kopcha, 2014). The subjects in this activity are all students of the pharmacy study program at the Islamic University of Malang in the 2022/2023 class. Researchers apply the ADDIE model to ensure students can use gamification-based digital teaching media that is integrated with LMS and participate in a series of learning activities that have been set by the campus effectively and efficiently so that learning objectives can be achieved optimally. In addition, product development that has been developed can be a means of using learning media in universities. The stages of ADDIE model development activities with gamification-based digital teaching media development products are presented in the following figure.

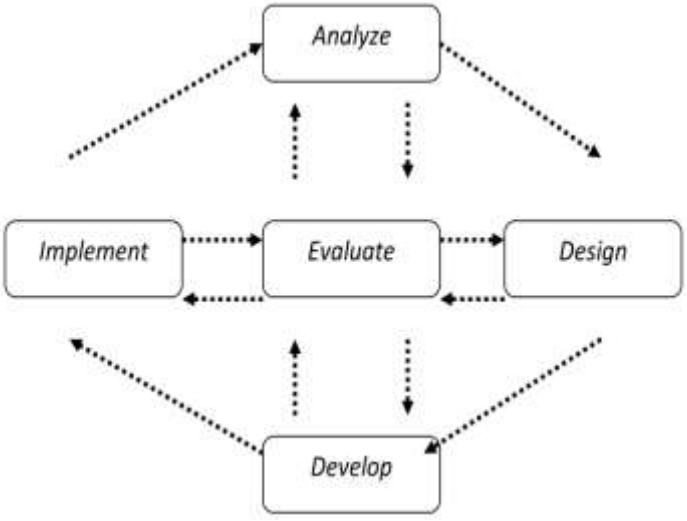

Figure.1 ADDIE Stage

Based on the picture, the researchers have compiled the developments in this study, which are as follows:

1. *Analysis*

   At this stage, the main activity carried out by researchers is to analyze product development needs. The analysis is carried out by collecting information and identifying it for the purposes of making products. The analysis in this activity is to determine student needs, learning conditions, problems faced by students and innovation technology in the form of digital teaching materials (media) with the concept of gamification.

2. *Design*

   This stage is known as the product design stage. At this stage, starting from making product designs, setting learning objectives or learning outcomes, compiling learning tools such as RPS (Semester Program Plans), looking for appropriate materials, and designing evaluation tools for learning outcomes. At the design stage, product specifications are developed in the form of digital teaching materials (digital learning media) that are integrated into the learning management system (LMS) with the concept of gamification.

3. *Development*

   Based on the product design that has been designed in the previous activity, at this stage the researcher begins to realize the design into a product. The product will be ready to be implemented and the level of success will be measured at the evaluation stage. Then, the product is tested by experts (experts) before being tested on users (students). Suggestions and input from these experts will be evaluated by researchers in order to improve the product. If the product that has been developed has feasibility and valid results, the product can be tested and implemented on the subject that is the target of this development research.

4. *Implementation*

   At this stage, the product that has been developed will be implemented in a real situation. The development stage is in the form of digital teaching materials (digital learning media) that are integrated into the learning management system (LMS) with the concept of gamification.

5. *Evaluation*

   This stage is carried out to measure the achievement of the goals that have been planned in product development. The evaluation data was taken through small group test and large group test. The purpose of this evaluation is to obtain feedback from the user. This could mean a revision stating the needs of the product have not been met.

   Data from validation questionnaires filled out by learning experts and practitioners, as well as student response surveys were evaluated descriptively based on the percentage of questionnaire results to determine the feasibility of the resulting product based on the results of expert validation and learning practitioners and student answers as test subjects. To test the feasibility of the developed dental media, the data analysis technique used was to convert research quantitative data into percentage form. If the analysis produces valid results, the module can be used; if the result is invalid, further adjustment is required. The research instrument uses a questionnaire with a scale of 4 with the following questionnaire criteria (Arikunto, 2013).

Tables. 1 Criteria Likert Scale Questionnaire

Score	Criteria
4	Very good
3	Well
2	Enough
1	Not good

After the data is collected, the data is processed using the formula (Arikunto, 2013).

$$Eligibility\ Percentage(\%) = \frac{Score\ obtained}{max\ score} \times 100\%$$

The data were analyzed using quantitative descriptive analysis techniques which were expressed in the distribution of scores and percentages of the predetermined rating scale categories. The suitability of aspects in the development of learning media is carried out using the criteria in the following table(Arikunto, 2013).

Tables. 2 Percentage Scale Table

Achievement Percentage	Interpretation
86% - 100 %	Valid (Not Revised)
70% - 85%	Sufficiently Valid (Not Revised)
50% - 69%	Less Valid (Revised)
0% - 49%	Invalid (Revised)

Furthermore, the development of this product can be said to be successful if the student achievement can exceed the predetermined criteria, namely there are 75% of the number of students who achieve some increase in scores from the pretest to the posttest period and they can pass the minimum score target.

Results and Discussion

The research and development (R&D) of the ADDIE model produces complementary quantitative and qualitative data. The results of the validation questionnaire and student answers obtained through expert validation activities and product testing are examples of quantitative data in this research and development. In research and development, qualitative data is in the form of ideas or comments from validators on product validation activities, as well as student responses and implementation based on the findings of product testing activities.

Expert Validation Result Data

Expert validation seeks to verify the validity and feasibility of the final product based on expert opinion. Before the product is tested, the results of the validation activities are used as a basis for improvement/revision. Three experts were involved in the validation activity: material expert, learning design expert, and learning practitioner.

The results of material expert validation, the first stage in the product development validation process on the validated aspects include organizational aspects, coverage, as well as the accuracy and currentness of the material presented in the module. A total mean of 94.7% with valid criteria without revision has been obtained as a result of validation by material experts. Complete data on the results of validation activities by material experts is presented in the following table.

Table.3 Material Expert Validation Results

Aspect	**Average**	**Criteria**
• Material organization	95.5%	Valid
• Scope of material	92.4%	Valid
• Material accuracy	96.2%	Valid
Results	**94.7%**	

The results of the material validation questionnaire analysis in Table 3 show that the features of digital media development materials are considered valid and suitable for use in learning. The content offered in the module is well organized and integrated with the Learning Management System (LMS) and covers a wide range of topics that are ideal for students of pharmacy study programs. The validator's recommendations regarding several criteria or important points such as the use of some inappropriate terms must be reviewed again, the suitability of illustration images with student environmental conditions must be a consideration for product development, the suitability of learning objectives with basic competencies and instructions for use that are not yet operational must be developed and used product development reference.

Furthermore, at the stage of validation of teaching materials and as a result of validation of teaching materials experts who provide assessments on aspects of the suitability of the display and digital media integrated in the LMS have shown very good results. The results of the validation by the expert obtained a total average of 88.78% with valid criteria without revisions to the development product.

Table.4 Results of Validation of Digital Media Display by Teaching Material Experts

Aspect	**Average**	**Criteria**
• Format and layout	90.5%	Valid
• Organization	84.8%	Valid
• Attractiveness	90%	Valid
• Use of letters and language	89.8%	Valid
Results	**88.78%**	

Table 4 shows the results of the analysis of the achievement of the digital media display validation questionnaire, which reveals that the digital media display as a whole is declared valid. Validator recommendations include cover appearance, image size uniformity, and color contrast between text and background.

The results of the validation of learning practitioners, with the validated aspects including the suitability of the digital media aspects developed, showed the validation results with a total average of 91.08% with valid criteria without revision. The validation stage is carried out by learning practitioners and the results of the validation activities by learning practitioners are presented in the following table.

Table.5 Results of Digital Media Validation by Learning Practitioners

Aspect	**Average**	**Criteria**
• *Self-instruction*	94%	Valid
• *Self-contained*	88.5%	Valid
• Stand-alone	89.2%	Valid
• Adaptive	92.6%	Valid
Results	**91.08%**	

Table 5 shows the results of the analysis of the achievement of the validation questionnaire by learning practitioners which shows that the digital media with the concept of gamification which is integrated with the LMS as a whole is valid and feasible to be tested. Some suggestions or notes that can be taken into consideration on the feasibility and suitability of the product development of the validator for summaries at each meeting should be completed because there are still some important concepts in the description of the material that have not been included, and some images such as illustrations should be revised and replaced with real images which are pictures of facts to reinforce the material/concepts explained on each topic presented.

Because it has met the feasibility of the validation results with valid predicates, large group trials are carried out by including the product in learning activities. After attending the lecture, the research subjects totaling 40 students in the large group trial activity were asked to fill out a response questionnaire. The results of the calculation of the questionnaire answers of large groups of students resulted in a total average of 86.8% with valid criteria without revision. The following table summarizes the results of the student response questionnaires in the large group study.

Table.6 Student Response Questionnaire Results

Aspect	**Average**	**Criteria**
• Self-instruction	90%	Valid
• Self-contained	86.2%	Valid
• Stand-alone	82.8%	Quite Valid
• Adaptive	84.6%	Quite Valid
• Appearance	90.4%	Valid
Results	**86.8%**	

Table 6 shows the results of the analysis of the success of each indicator item in the large group test student response questionnaire, which shows that the module meets the desired standards in terms of material, appearance, and media used. As test subjects, all students indicated that digital media was satisfactory and there were no ideas/suggestions for improvement.

Implementation of Product Development with an Online Inquiry Learning Model Approach

The development of an inquiry learning model using the Research & Development (R&D) ADDIE model with development products in the form of gamification-based teaching materials (digital teaching media) integrated with the Learning Management System (LMS) has been validated and tested on all subjects of this research. Furthermore, to test the success of this product that has been developed, researchers have implemented the use of digital media or teaching materials that have been developed for a number of students from the pharmacy study program, a total of 40 students at the Islamic University of Malang in the odd semester 2022/2023 academic year.

The concept of inquiry learning is carried out in two levels of learning, namely synchronous and asynchronous (Watson et al., 2020). Based on the results of the evaluated data, the inquiry learning process and approach has been carried out in several stages, consisting of orientation, exploration and concept formation, implementation, and closure. All stages as an inquiry learning model procedure which includes orientation, exploration, concept formation, and application activities have been completed asynchronously through LMS, while

closing will be completed face-to-face in class (zoom meeting). Before students start studying, the lecturer prepares the content and prepares them to start learning online, and they will be given homework before entering the class. In addition, during class, students and lecturers will discuss previous assignments.

Orientation. At this stage, students will see videos provided by lecturers, have video access via LMS, and can watch videos anytime and from any location. Lecturers in this case make their own videos. The learning video contains the learning objectives that students want to achieve, as well as motivation and past knowledge to connect previous information with the topic to be studied.

Key questions and concept development After watching the film, students are given a model, which can be in the form of pictures, graphs, tables, and so on. Model-based key questions are provided to guide students in discovering their own concepts.

Application. After the discovery of the concept, students were asked questions to assess their understanding of the concept. These questions can help students gain confidence and a solid understanding of ideas. At this point, students can hold discussions with their peers in their respective groups.

Closing. students start learning during the synchronous phase, where the lecturer discusses the concepts that the student has learned and the student can validate the knowledge. Students report the results of previous discussions and questions in class. Lecturers accompany students during the learning process and if necessary, justify concepts.

At the initial implementation stage, the researcher conducted a pre-test to determine the initial ability of the research subject and then a test was carried out at the end of the lecture. Lecture activities are carried out online (online) according to a predetermined lecture schedule. During lecture activities, students (respondents) conduct lectures online through the LMS that has been developed. Teaching materials/digital materials from development products are also included in the LMS so that all digital materials have been integrated into the campus LMS. At the end of the lecture, namely UAS, the lecturer has conducted a test (post-test) to determine the development and feasibility of the product that has been developed. The questions tested on the test are in the form of a reading test with a total of 40 questions in the form of multiple choice (PG). The results of the pre-test and post-test can be seen in table 7 below.

Table. 7 Student Test Results

Test results	**Pre-test**	**Post-test**
Average	62.5	89.5
Highest score	74	88
Lowest score	60	66
Graduated	8	36
Presentation	20%	90%

Based on the results of the Pre-test and Post-test in table 6 above, it is known that student scores are better as a result of completing learning activities using an inquiry learning model with gamification-based digital teaching materials development products (digital teaching media) that are integrated with LMS. In the pre-test, the average value was only 62.5, but it increased significantly in the post-test which was 89.55. The highest score on the pre-test was 74 and the score on the post-test was 88. Meanwhile, the lowest score also showed a

significant increase in their post-test score compared to the pre-test. The pre-test resulted in the lowest score of 60 and the post-test of 66. The effectiveness of the product can also be seen with classical completeness. Furthermore, in the pre-test the number of students who passed the minimum score was 8 students (20%) while in the post-test the graduation rate or classical completeness was 90% with the number of students who passed the test as many as 36 students. Based on these results, it can be concluded that the development of an online learning model with an inquiry approach with gamification-based digital teaching materials development products integrated with LMS can improve reading skills and understanding of pharmaceutical terms in pharmacy students at the Islamic University of Malang.

Efforts and strategies used by educators are part of the process or activity to support and achieve learning objectives optimally, precisely, and quickly related to the effectiveness of learning (Llewellyn, 2013). According to this definition, the feasibility of teaching media or digital teaching materials with the concept of gamification that is integrated with the LMS that has been developed and produced is the goal of developing media for improving the quality of learning and problem solving in the classroom, especially for students of the pharmacy study program at the Islamic University of Malang in terms of increasing ability. reading and understanding of terms used in pharmacy. The study of improving the quality of learning is based on the results of questionnaire responses from students who have carried out overall learning activities as test material, but the study of classroom problems will be discussed in the section on the suitability of the module with development objectives. Based on the results of the validation tests that have been carried out by experts, the product development of media or digital materials in this study has met the requirements because the validation results show valid results.

Learning activities and the use of media begin with the presentation of learning objectives in accordance with the expected basic competencies, so that participants understand the direction of learning and the goals to be achieved. Learning subjects in the media made is presented in a straightforward manner, with visual illustrations and examples of difficulties relevant to the student's environment. Based on the findings in this study, the media that has been developed has characteristics that refer to the learning objectives in accordance with the basic competencies in the courses that have been carried out. In accordance with the (Spronken-Smith, 2007), One way to increase clarity in learning is to offer material as easily as possible according to the developmental level of students and relate it to the knowledge they already have.

The novelty of the product resulting from the development of the inquiry learning model is a learning model in which the lecturer tries to direct students to be able to analyze, evaluate and find solutions to what has been obtained during learning activities through LMS and digital teaching materials that have been developed. So that students are able to think and engage in intellectual activities and process the learning experience into something meaningful in real life. At the implementation stage, learning activities with the inquiry learning model approach have been carried out in stages: (1) The stage of presenting the problem where at this stage the lecturer provides questions as a stimulus for students to collect information related to the relevance of the topics discussed at each meeting. (2) The data verification stage where the lecturer provides guiding questions so that students are able to identify and formulate hypotheses on each topic discussed. (3) Conducting experiments and collecting data where at this stage students are invited to collaborate and carry out experimental activities or collect data from existing problems. In this case, the role of students is to conduct experiments or collect data and collaborate in collecting data. (4) Formulating an explanation, the lecturer invites students to analyze and discuss the results obtained so that students get the correct concepts

and theories according to scientific conceptions. (5) Conducting an inquiry analysis, the lecturer asks students to record the information obtained and is given the opportunity to ask questions about anything related to the information they previously obtained and then the lecturer gives practice questions if needed.

Important instructional objectives that can be achieved with the inquiry learning model (Maulana, 2012) are as follows: Academic learning outcomes will increase further because with this inquiry learning model students avoid boredom and awaken new learning motivations. Based on the results of this study, the digital media that has been developed has fulfilled these elements. Inquiry learning provides opportunities for students from various backgrounds and conditions to work together and depend on each other to solve the problems they face. Social problems that require solutions in solving them will make students more enthusiastic in solving them and finding solutions. In this study, lecturers have also encouraged students who already understand to clarify in the discussion thread in their language. Lecturers can identify students who have mastered educational material by observing their activities in tests or questions. Lecturers can identify students who already have unique thoughts and apply them to well-known themes (Sopandi, 2017).

This research is limited to the development of gamification-based digital teaching materials in one course for students of the pharmacy study program at the Islamic University of Malang. Based on the results of product development and implementation, it is hoped that further research can develop the results of this research by focusing on writing or listening skills because this research is only limited to reading comprehension skills in pharmaceutical terms for students of the pharmacy study program. Furthermore, regarding the effectiveness of the results of product development in this study, it is hoped that further researchers can use more varied digital media such as interactive presentations with H5P development on LMS features and tested on more subjects.

CONCLUSION

From the results of this study, it can be concluded that based on the results of validation by material experts, a total average of 94.7% was obtained with valid criteria without revision. Furthermore, the results of validation by learning design experts showed a total average of 88.78% with valid criteria without revision. The results of validation by learning practitioners obtained a total average of 91.08% with valid criteria without revision. The results of the calculation of the questionnaire answers of large groups of students resulted in a total average of 86.8% with valid criteria without revision. Thus, it can be concluded that the results of digital media development products based on gamification that are integrated with the LMS are valid and feasible to be tested and implemented.

The inquiry learning approach is used in several stages, which consist of orientation, exploration and concept formation, application, and closing. Based on the results of the pre-test and post-test, it is known that the average score is only 62.5, and it increases significantly in the post-test, which is 89.55. The highest score in the pre-test was 74 and the post-test score was 88. The lowest score in the pre-test was 60 and the post-test was 66. Furthermore, in the pre-test the number of students who passed the minimum score was 8 students. (20%) while in the post-test the classical graduation rate or completeness was 90% with the number of students who passed the test as many as 36 students. Based on these results, it can be concluded that the development of an online learning model with an inquiry approach with gamification-based digital teaching materials development products integrated with LMS can improve reading skills and understanding of pharmaceutical terms in pharmacy students at the Islamic University of Malang.

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