The Development of Blended Learning Media for Flipped Classroom Model on Direct Learning in Process Evaluation Courses and Chemistry Learning Outcomes

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Abstract—**The development of knowledge and technology is a challenge for educators to be creative in learning. Innovative and interesting learning media is needed now to anticipate the times. This study aimed to develop blended learning media with a flipped classroom model on direct learning in the course of evaluating chemistry learning processes and outcomes. This research was R & D research using the development model of Borg & Gall. The results showed that blended learning media for flipped classroom model proper to use in the evaluating the process and the chemistry learning outcomes lecturing which were shown from the results of the feasibility test from aspects of material, graphics, and language obtained an average of 95.33 is very high categories. Limited and extensive trials on students showed the readability of high category media. The effectiveness test also showed that the use of blended learning media for flipped classroom model on direct learning could increase students learning interest in Chemistry Education study program.**

Keywords— blended learning; development; flipped classroom

I. INTRODUCTION

Effective and efficient learning can be created if learning can take place optimally with a conducive learning atmosphere. Various problems in the learning process which usually disrupt the learning atmosphere need to be anticipated beforehand so that learning can take place as optimally as possible to achieve the planned learning goals. One way for learning to be effective and efficient is to use learning media. Learning media is a teaching aid to deliver material so that messages are more easily accepted and make students more motivated and active [1]. Thus learning media can help educators in achieving learning goals.

Knowledge and technology that are increasingly developing at this time is a challenge for educators in developing learning media that are in line with the times and characteristics of students. Electronic media, such as the internet as a result of technological development, is something very important and important for students in today's life. The survey results from the Indonesian Internet Network Management Association (APJII) found that internet users in Indonesia had reached 51.8% of the total population. Indonesian culture that has shifted towards digital culture must be used by educators as an important component in the learning process to develop learning media according to the times. Blended learning is one solution that can be implemented by educators in learning. Integration of ICT in learning needs to be done by integrating ICTs including the internet as a tool in the learning process [2]. The internet can be used as a learning medium to help educators in delivering learning material. Computers and network technology over the past decade offer new educational models and unique ways to connect with their students, inform, collaborate, and assess the learning process [3].

Blended learning is learning that combines face-to-face learning and online learning. Some research results show that blended learning strongly supports learning and helps students in achieving optimal performance and skills in the use of technology. The development of the blended learning model is able to improve student learning outcomes [4,5]. As many as 60% of students like learning in blended learning because it is easy to access subject matter and improve ICT skills, and motivates students to use ICT optimally [6]. Students experience a significant increase in understanding the character and analytical skills of students in technology-based mathematics learning [7]. Learning flipped classroom model can be used to support blended learning.

The implementation of blended learning that can be used in learning is a flipped classroom model. This model is centered on students (student-centered), so students actively build their knowledge and obtain information as widely as possible outside the classroom. In traditional learning, educators are dominant in the learning process. Traditional learning that leads the class is the teacher, the student as the object of learning. The learning style follows the instructions of the teacher, students like following the training activities [8]. Flipped classroom learning model of students is the subject and

object of learning, learning styles according to student characteristics, using problem-based methods, discussions, students receive advice and motivation to solve problems. This means that the learning model based on the flipped classroom prioritizes the learning process of students to gain knowledge rather than ordinary learning models that only consider students as learning objects. Flipped Classroom is an inverted learning model or flips the class applied by the teacher to students. The results showed that the flipped classroom model could help students understand the subject matter. in the study of blended learning model for flipped classroom strategies on multimedia design subjects at SMK PGRI Ploso, it was concluded that blended model could improve student learning outcomes [9].

Flipping classes is a particular type of blended learning design that uses technology for learning outside the classroom and carries out classroom learning activities to train understanding of material [10]. The involvement of students actively in learning by using the internet will provide a very pleasant and important experience for students in the 21st century. The results of the research at the University of Beira Interior, Portugal concluded that focusing learning on students required an interactive environment between students and lecturers with students as the center and lecturers as facilitators, where students must be active in learning [11]. Educators can use the internet to develop learning models based on information and communication technology to enable students to learn. Blended learning is a combination of face to face and online, face-to-face learning and online learning [12]. Face-to-face learning is done in one place and at the same time, so there is a direct interaction between the teacher and student [13]. So blended learning can change the learning atmosphere of students, because learning does not only take place face to face in class, but learning can take place online. Learning materials are packaged in the form of interesting learning videos given first by educators to students before class learning takes place. Learning videos must be seen by students in their homes. Classroom learning takes the form of discussion and completing assignments. The lecturer guides students in class in discussion activities and completing assignments.

Evaluation Courses Process and Chemistry Learning results are one of the subjects in the Chemistry Education Study Program which is taught in semester 5 (five). The results of interviews with students found that students had difficulty when developing authentic assessments on a learning model, for example developing authentic assessments in inquiry learning model. Authentic assessment material is conveyed by lecturers in class learning in 2 (two) meetings, while for its development in the form of assignments to design authentic assessments in a learning model is used as a group assignment to be done at home. * The performance of students when doing homework develops authentic assessments on a learning model through direct learning cannot be measured because lecturers are unable to check directly one by one group discussions conducted by students outside the campus. Through blended learning media for flipped classroom model, lecturers can deliver lecture material online, while authentic assessment development exercises on the learning model can be done in the classroom by direct lecturers. Meanwhile, the lecture process is still centered on lecturers (teacher centered) using direct learning. The lecturer delivered the learning material. Then the students discussed the exercises that the students had to do. Then the student representatives presented the results of the discussion. For this reason, blended learning media for flipped classroom model can be used as a solution to overcome the problem of limited time and traditional learning in the Chemistry Education Study Program in the course of evaluating the processes and learning outcomes of chemistry.

The research results on the implementation of blended learning showed that learning the blended learning model had a positive impact on students. Syukur concluded that (1) there were differences in motivation and learning outcomes in students taught with blended learning compared to conventional learning and (2) there was an increase in student motivation and learning outcomes due to the implementation of blended learning [14]. Blended learning is more effective than e-learning or face-to-face. Students learning outcomes in blended learning were higher than in e-learning or face-to-face [15]. According to Purnomo et al., with the implementation of blended learning with online design - face-to-face learners can almost all follow the learning process well as indicated by the value and activity in the classroom [16]. Sutisna which shows that the level of independence of student learning after applying the blended learning method is classified in the good category with the pattern used, namely online - face to face – blended [17]. Good learning outcomes are also inseparable from mastery of the concepts students have because learning outcomes are related to students' conceptual understanding [18]. So to improve mastery of students' concepts can be done by applying the blended learning method.

Based on the facts and theories above, it is very urgent to conduct research on the development of blended learning media for flipped classroom model on direct learning in the course of evaluating the process and results of learning chemistry. Through this research, it is expected that the media that can be used in direct learning will be produced so that learning is not centered on lecturers. This study focuses on the study "How is the feasibility and effectiveness of blended learning media with a flipped classroom model on direct learning of student learning interests in the course of evaluating chemical learning processes and outcomes?"

II. METHOD

This study uses the R & D (Research and Development) approach with a simplified research design from Team Puslitjaknov [Borg] and Borg, namely; 1) Conduct needs analysis, 2) Design blended learning media for flipped classroom model, 3) Conduct media validation by media and material experts, 4) Perform limited trials with blended learning media for flipped classroom model and product revisions, and 5) Conduct tests extensive field trials and product revisions.

The research subjects were blended learning media with a flipped classroom model which was tested with FKIP Untan Chemistry Education lecturers as many as 2 people and 9 students in a limited trial. Extensive trials were conducted on 2 lecturers and 15 students. The research was carried out in FKIP

Untan in July - October 2018 in the Chemistry Study Program of FKIP Tanjungpura University (Untan) Pontianak.

Data collection tools used in the study were observation, interviews, and response questionnaires. Observations are made before analyzing the product to be developed. The purpose of the observation was to obtain field data relating to the basis of conducting research and development of blended learning media for flipped classroom model. Interviews were conducted with lecturers and students to obtain data on needs in research and development. Questionnaires were used to obtain data on the assessment of the quality of media feasibility developed according to media experts as many as 3 people, experts on chemical material as many as 3 people and students on limited and widespread trials of blended learning media for flipped classroom model.

The research activity begins with a needs analysis which is a need assessment process which consists of activities, namely: observation, interview, and questionnaire. The second stage is designing blended learning media for flipped classroom model. In this study the learning media produced was in the form of supplements of interesting packaged authentic assessment materials and Student Worksheets (MFIs) which must be discussed by students in groups. This media and MFI can be accessed by students via google classroom. The third stage is validation by two media experts and two people. The validation results are used as a reference in revising the developed media. The fourth stage is a trial limited to 9 chemistry education students, and 2 lecturers using the revised blended learning media flipped classroom. Furthermore, the fifth stage is conducting extensive trials on 15 chemical education students and 2 lecturers. Input from lecturers and students was used to revise the developed media.

III. RESULTS AND DISCUSSION

In accordance with the purpose of this study is to produce a feasible product in the form of blended learning media with a flipped classroom model on direct learning in the course of evaluating chemical learning processes and results in authentic assessment material, the product developed must be tested for feasibility so that it is suitable for teaching. This development media has been validated by experts and tested the level of product attractiveness, convenience, and usefulness.

A. Conducting Need Analysis

The results of giving the interest in learning questionnaires to Chemistry Education Study Program students as shown in Figure 1 indicated that students were less interested in participating in the lectures carried out by lecturers and preferred to search for information through the internet. Students who do positive learning activities are not more than 50% unless they are happy when learning to use the internet.
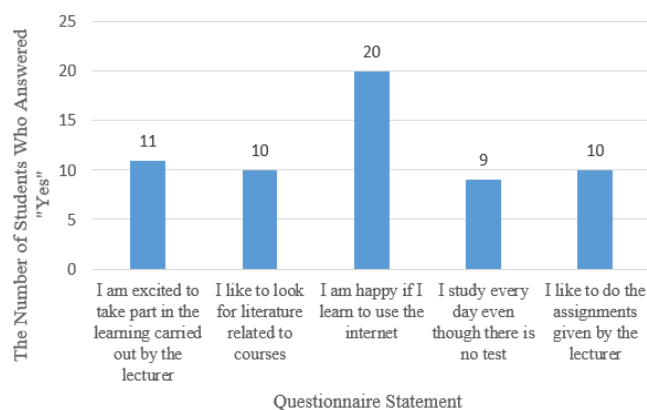

Fig. 1. Results of the questionnaire for learning interest for need analysis

Lack of interest in students in learning will have an impact on the attitude shown when learning. Students who are interested in learning, then the attitude shown in learning looks happy and seems compelled to study diligently [20]. The results of observations in the class show that student activities and participation in learning are still not optimal. Students tend to listen more than actively participate in learning.

Learning tends to be traditional, starting with explanations with examples using power point, then asking students to answer some questions given by the lecturer. In traditional learning that controls the class is educators, students as objects in learning. Students like following training activities [8]. The learning process conducted by lecturers is monotonous and dominating is considered to be one of the causes of students' lack of interest in learning.

Authentic assessment material is one of the materials given to students in the EHBPK Course. Experience teaching lecturers of EHBPK courses so far in learning authentic assessment material, students are only given the task of reading teaching materials at home related to the material to be taught. It was found that 25% of students read the previous material. This also affects the success of students in developing authentic assessments. It was found that 72% of students still did not understand how to compile rubrics and implement authentic assessments in learning. Supported by Hairida's research results [21] on the skills of chemistry teacher candidates in the Chemical Education Study Program in developing alternative assessment it was concluded that the preparation of assessment rubrics was an obstacle for prospective chemistry teacher students in designing alternative assessments.

The questionnaire given to students shows that students want a change in the learning process. As many as 91% of students stated that the lectures carried out by lecturers were monotonous, and 88% of students wanted the use of technology in learning. The results of the observations also show that students generally have a smartphone, so it is very supportive of the use of the internet in learning. Online activities can be used to collect various information or access interesting things related to school [22]. The needs analysis carried out by other researchers is collecting and reviewing the literature relating to the development of products and materials for product testing. This is done so that the products produced

really answer the problems faced by lecturers and students of the FKIP Untan Chemical Education Study Program.

B. *Designing Blended Learning Media for flipped Classroom Model*

The design of blended learning media was made by media teams and researchers. This media was developed based on needs analysis. The blended learning media combines face-to-face learning with online. Blended Learning media display with the google classroom application can be seen in figure 2 below.
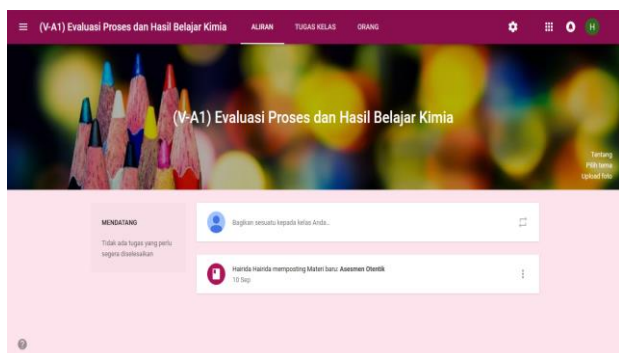

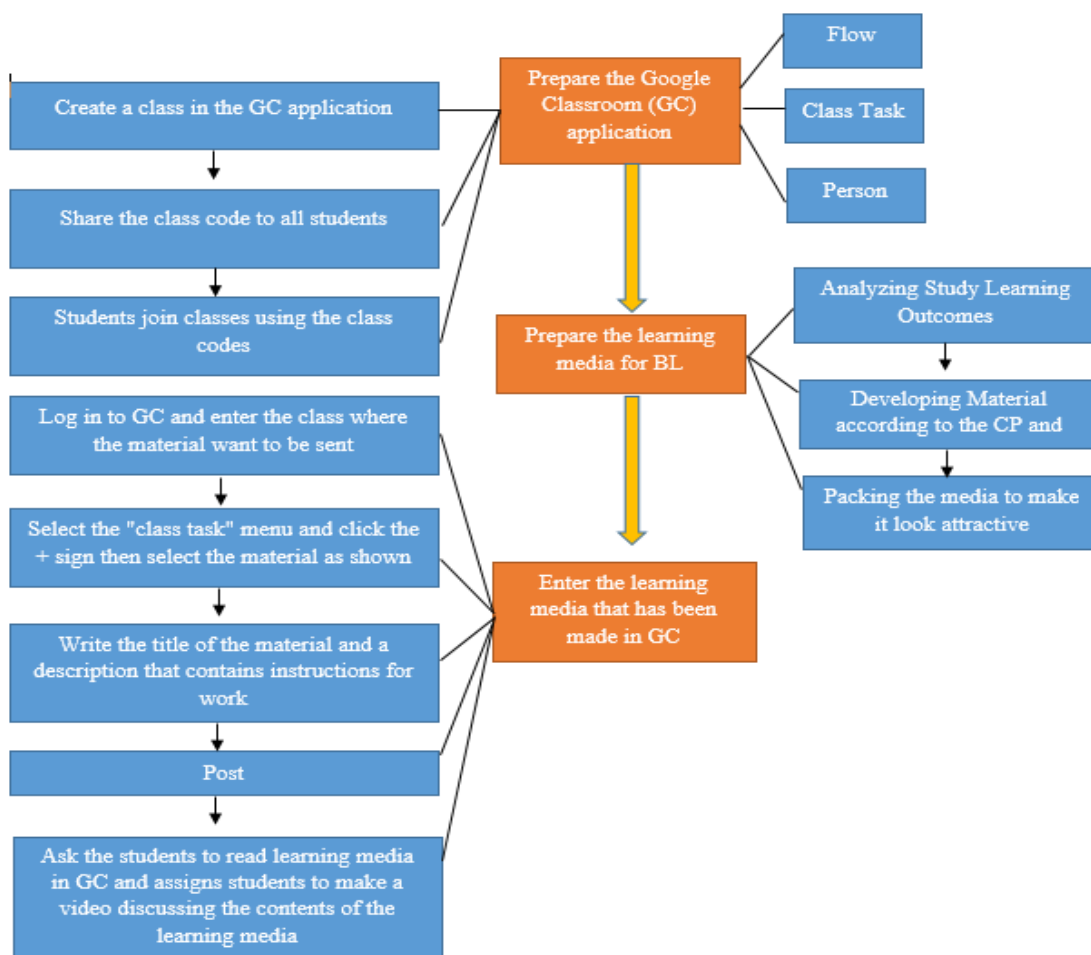Fig. 2. Display of blended learning media in Google Classroom

In this media, a web that contains all the needs that can help students learn lecture material includes e-supplements, LKM (Student Worksheets), discussion forums, so that with a flipped classroom model students can study independently / group at home by opening google classroom . Student / group activities are recorded and sent to google classroom. Students can access all information sent by lecturers anywhere through google classroom, so this blended learning media can be a supplement to the subject of evaluating chemical learning processes and results.

Blended learning media with a flipped classroom model was designed with the following steps:

Fig. 3. Blended learning media design for flipped classroom model

C. *Validating Developed Products*

Products that have been developed from the results of the needs analysis are then validated by experts in media, material, and language. Media experts, material experts and linguists were two people each. The results of the validation of blended learning media for flipped classroom model described as follows:

TABLE I.   RESULTS OF MEDIA EXPERT VALIDATION, MATERIAL, AND LANGUAGE

No	Name	Percentage Score	Criteria
1.	Matter Expert	100%	Very Good
2.	Media Expert	93,3%	Very Good
3.	Language Expert	88%	Very Good

Based on the results of the material expert validation, the average score was 100% with very high categories, so the material presented in the media products was feasible to use with some revisions according to the advice given by material experts. The material experts suggest to include authentic assessment characteristics so that authentic assessments made by students actually refer to real situations and measure students' ability in various possible solutions to problems faced in real situations. It could be seen in Figure 4.

Before Revision:
The figure above also shows that the scope of the commission is narrower than the evaluation and is usually only limited to one component or aspect only. The assessment is usually carried out in an internal context.

After Revision:
The figure above also shows that the scope of the commission is narrower than the evaluation and is usually only limited to one component or aspect only. The assessment is usually carried out in an internal context. Authentic assessment has the following characteristics:
Authentic assessment can be used to formative or summative. That is, authentic assessments can be done to measure the achievement of one or several basic competencies as well as achieving student competencies in core competencies in one semester.
Measuring skills and performance, not just remembering facts.
In authentic assessment, all aspects of students' skills, knowledge, and attitudes are measured. Assessment is not only for measuring competencies that are memorized or memory-only.
Authentic assessment is carried out in a continuous and integrated manner. That is to say that authentic assessment must be carried out continuously and is a whole as a whole. This is done so that the development of student learning can be truly measurable.
Authentic assessment can be used as feedback on achieving student competency comprehensively [23].

Fig. 4. Material expert revision.

The product validation process was continued by media experts. The results obtained an average score of 93.3% with a very high category so that the developed media products were declared fit for use in accordance with the revisions suggested by media experts. Media experts also revised the appearance of the media.
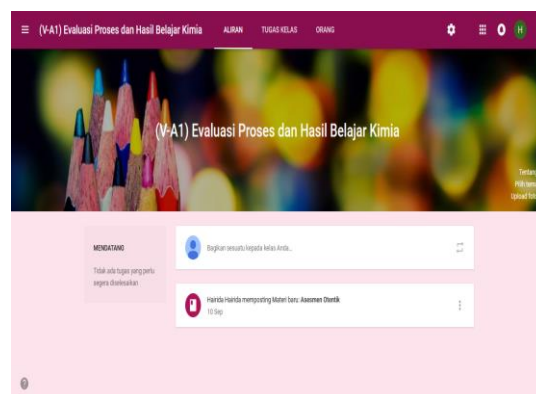

Fig. 5. Media expert revision.

The last validation was by two linguists to validate the language for the material used in blended learning media. The results obtained an average score of 88% with a very high category, so the products developed were declared suitable for use according to the revisions suggested by linguists. The revision of linguists can be seen in Figure 6.
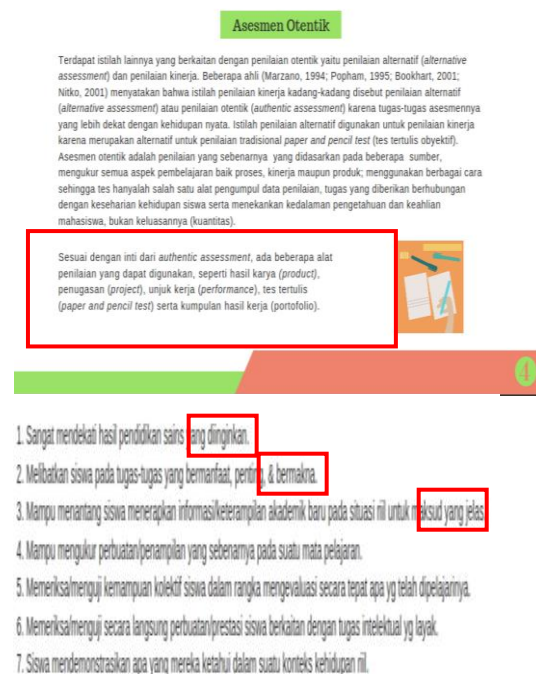

Fig. 6. Linguists revision.

D. Conducting Limited Trial

The revised media products were subjected to limited product use tests using questionnaires or closed questionnaires that have been provided with answer choices. The questionnaire was given to 9 (nine) FKIP Chemistry Education Study Program students who were selected based on high, medium, and low GPA in classes A1, A2, and PAPK. Each class was chosen by three students. The results of the response test were limited; the average score of 77.95% was included in the high category. The average score showed that the use of blended learning media for flipped classroom model on direct learning was very feasible.

E. Conducting Extensive Trial

Media products developed after being revised based on the results of a limited trial then carried out a broad trial using a questionnaire on 18 students of the FKIP Chemistry Education Study Program Untan. Each class was chosen by 6 students based on their high, medium and low GPA. The average product trial score was 79% with a high category. The average score showed the use of blended learning media products for flipped classroom model on direct learning in the evaluation process and chemistry learning outcomes.

The effectiveness test was conducted to determine the effect of the product developed on the learning interest of FKIP Untan Chemistry Education Study Program students. This test uses interest questionnaires given before and after learning with interest indicators consisting of 1) Discipline, 2) Loving Feelings, 3) Attention, and 4) Engagement. Questionnaire contains 20 statements consisting of 12 positive statements and 8 negative statements with four answer choices. Positive statement, answer strongly agrees (SS) was 4, agrees (S) was 3, disagrees (TS) was 2, and strongly disagrees (STS) was 1. Conversely, for negative statements, the answer strongly agrees (SS) was 1, agree (S) was 2, disagree (TS) was 3, and strongly disagree (STS) was 4.
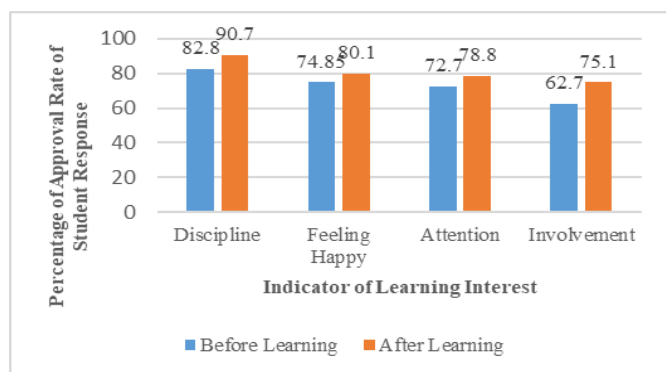

Fig. 7. Student interest before and after learning.

Figure 7 above shows that after learning using blended learning with a flipped classroom model, student learning interest for each indicator has increased. Before learning using blended learning for flipped classroom model, only using direct learning, the average student interest in learning was 73.26%, while after learning using blended learning for flipped classroom model, the average student interest increased to 81,

18%. This means that learning using blended learning with a flipped learning model in direct learning on authentic assessment material has a potential effect on students' interest in FKIP Chemistry Education Study Program Untan Pontianak.

This increase in interest occured because in learning using blended learning for flipped classroom model. The flipped classroom model as a strategy was effective in maximizing the responsibility of students to explore learning material online so as to support motivation and interest [24]. In Figure 3 it also shows that indicators of involvement or participation in learning have the highest change in scores between before learning and after learning compared to other indicators. This happens because in blended learning with a flipped classroom model, students are conditioned to learn independently actively. Student learning activities are more than lectures in ordinary classes, so student involvement in learning is quite large [25].

IV. CONCLUSION

The results of validation from media experts and material experts showed that the blended learning media of flipped classroom model on direct learning in the process of evaluating processes and chemistry learning outcomes was feasible of being used in lectures with the average results of material experts, media and linguists as good. Learning using blended learning media for flipped classroom model on subject evaluation processes, and chemistry learning outcomes could increase students' interest in learning.

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