

## FLIPPED CLASSROOM LEARNING TOOLS TO MAXIMIZE ABILITY THINKING HIGH LEVEL OF STUDENTS

**Hamzah Upu<sup>1</sup>, Andi Ika Prasasti Akbar<sup>2</sup>**

<sup>1</sup> Pendidikan Matematika Universitas Negeri Makassar

Email: [hamzahupu@gmail.com](mailto:hamzahupu@gmail.com)

<sup>2</sup> Pendidikan Matematika UIN Alauddin Makassar

Email: [ikaprasasti@gmail.com](mailto:ikaprasasti@gmail.com)

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### **Abstract**

*This study aims to produce a flipped classroom device that utilizes google classroom to optimize high-order thinking skills of high-quality students. This type of research is Research and Development. The development model used is the ADDIE (Analysis, Design, Development, Implementation, Evaluation) model. This research was conducted in Mathematics Education class 1.2 semester 3, Faculty of Tarbiyah and Teacher Training at UIN Alauddin Makassar. The research instrument used expert validation sheets, student and lecturer response questionnaires, and learning outcomes tests. The results showed that the average score of the validation results of learning tools: Lesson Plans, Learning Videos, Online Assignments and Higher Order Thinking Ability Tests were valid based on the criteria assessment. the practicality of learning tools based on positive student and lecturer responses. The effectiveness of the learning device is seen from the completeness of the higher order thinking ability test results that have been achieved. Through the development phases, quality products are produced that meet the criteria of validity, practicality and effectiveness.*

**Keywords:** / Flipped classroom, google classroom, ability think level tall

## **INTRODUCTION**

Industrial revolution 4.0 brought changes in human life. This is marked by information technology which has become the basis for human life (Kemristekdikti., 2018). The industrial revolution 4.0 has an impact on all field , not except field mathematics education .Availability technology information causes students or students to be able to access information about anything which they want with fast and more easy. For answer challenge era revolution industry 4.0, education need prepare graduate of which quality, have the ability to predict and deal with a changing future very fast and mastering technological developments, one of which is the ability to think high level. In fact, the implementation of Indonesian national education has not fulfilled, this is shown from the achievement of education in Indonesia is still less encouraging. Based on the results of *Trends in Mathematics International and Science Study* (TIMSS) on year 2015 show that average score which obtained by participant educate from Indonesia as big as 397, whereas average country for participant TIMSS as big as 505,684. Thing this indicates that ability think level tall participant educate Indonesia still low because questions The questions submitted by TIMSS are classified as questions whose work requires higher order thinking skills, such as creative thinking skills. It is of course no could left in progress Keep going continuously, should there is repair on process learning which in progress moment this. *Flipped classroom* using technology that supports information about learning that can obtained anytime and anywhere. This is in line with one of the policies higher

education in facing the era of the industrial revolution 4.0, namely applying blended learning which is learning that combines face-to-face with a system on line. *Flipped classroom* this is wrong one example from learning *blended learning*. Educators who use the internet in learning has given understanding which more large about objective teaching they (Umugiraneza, 2012). The existence of the *Flipped Classroom* is in demand by educators and students at various levels of formal education (Maciejewski, 2016) .

Critical thinking skills and students' independence in learning can be built with a *flipped model* (Flaherty & Phillips, 2015) . This *flipped classroom* requires internet and communication between educators and students, so the availability of equipment and Internet as well as Skills for look for information and communication dangat important (Sojayapan & Khlaisang, 2018) . Students spend a lot of time on using technological tools so that it will be possible for them to remain always interact with friends, educators, and learn material anywhere, right? only in the classroom, but also outside the classroom with distance learning (Fisher, 2009). *Flipped learning* have an impact positive on learning motivation, attitude, and involvement student (Su & Chen, 2018). Bergmann & Sams (2012) believes that *flipped classroom* could Upgrade lack of learning conventional. Johnson ( 2013) explained that *flipped classroom* is something method which could give proportion time more many for lecturer for interact with college student in in class During process learning in progress, with utilizing technology that provides information about the material to be discussed which can be obtained online, so that learning is of higher quality and improve student knowledge. *Flipped classroom* has a positive impact for learning activities (Zainuddin & Halili, 2016).

*Flipped classroom* is believed as a good technology used in higher education. This method generates innovation in problem solving both in the classroom learning process and outside the classroom through technology (Mohamed & Lamia, 2018). From opinion According to this study , the *flipped classroom* referred to by the researcher is a model that blend Among learning based on on line and stare advance, where Theory students learn outside the classroom through online and discuss what they do not understand at schoolclass. There is a number of application which could used on model *flipped classroom* Among others are *Edmodo*, *Class Dojo*, *Classe*, *Google Classroom* and others. In this research used application *google classroom* which will make it easy college student and lecturer in system learning. *Google Classroom* is a application which created by Google which allows the creation of classrooms in cyberspace. This application is one of the learning tools that utilize technology. In addition, *Google Classroom* can be a means of assigning assignments, *submitting* assignments and even to evaluate the collected tasks (Herma, 2014). Therefore, This application can help lecturers and students in carrying out the learning process with more depth. Goals facing educators and curriculum developers is push student in think level tall (Hugerat & Kortam, 2014). The use of *flipped classroom* is very possible in improving skills think high level (K. Lee & Lai, 2017). Thinking skills and abilities level tall is a factor important success good in academics nor in world work (J. Lee & choi, 2017). According to literature, et al. (2011:6) higher order thinking is an activity that involves brain work, for example grouping, induction, deduction, and reasoning processes. Higher order thinking skills are one of the skills needed to face the era of the industrial revolution 4.0, including the level of analyzing, evaluating and be creative. (Abdullah et al., 2017) say that application learning Skills think level tall mathematics important for change stigma public to difficulty mathematics. Based on Thing that's, researcher developing *flipped classroom tools* using *google classroom* to empower higher order thinking skills

## **METHODS**

Research \_ this is *Research and Development (R&D)* that use model ADDIE development, which consists of five stages, namely: (1) stage analysis ( *analysis* ), that is process analysis need, identify problem (need) and To do analysis Duty. (2) Step design ( *design* ), that is researcher compile learning tools that can be used to improve thinking skills high level of student and learning outcomes. (3) the development stage , namely researchers make product designs that are ready to be tested and validated device learning. (4) Step implementation ( *implementation* ) that is done test try device learning which developed to object study. (5) Step evaluation ( *evaluation* ) that is evaluation process from media which developed. Exactly test the device learning which developed namely in the Department Education Mathematics Faculty Tarbiyah and teacher University Islam Country Alauddin Makassar. The subjects of this research trial were Semester III students of the academic year 2019- 2020 in Statistics course Education. The instruments in this research are expert validation sheets, student and lecturer response questionnaires, and learning outcomes tests. Test validity in study this that is, if each component device learning which generated fulfil category minimum valid. Device learning said practical if results test practicality device learning which developed to get a positive response from students and lecturers. Test effectiveness carried out to find out to what extent the learning tools developed useful and easy for students in understand the material and do the questions which related with indicator ability think level tall. Thing this showed with students' ability to work on thinking skills questions level tall which has been designed by the researcher. If at least 75% of students get grades on 75, then learning device is said effective

## **RESULT AND DISCUSSION**

The stages of developing learning tools based on the ADDIE model are as follows:

### **1) Stage analysis**

Stage analysis is something process need, identify problem and perform task analysis. During the learning process, there is potential allowed to use a smartphone or laptop in the learning process and College student own trend use smartphone or gadgets they for access some information when needed. However, the maximum use of technology has not been implemented in support the learning process. Learning tends to be done using the method lectures or discussions without a particular learning model. In addition, the results of observations and the interview concluded that the learning model used during the learning process has not been effective. At the analysis stage, it appears that there is a possibility to use technology in the learning process.

The important issue is application method learning previously monotonous with discussion or lecture methods and did not utilize technology to the fullest. The second problem is independence and will college student for study independent with look for various practice question and Other learning resources are also still relatively lacking. As a result when studying the material new, college student truly not yet understand and on finally no want to ask because they no know what which should asked. When learning, para college student which ask questions choose directly ask the lecturer if you find difficulties without try finish it first.

### **2) Stage design**

At the design stage, the researchers compile device learning which could used for Upgrade students' higher order thinking skills and learning outcomes. Learning model which used is *flipped classroom* which utilise use *google classroom* . Device learning which made use model learning *flipped classroom* which is fusion Among learning direct and on line. As for the device learning include: ( 1) Plan Learning, ( 2) Duty online, ( 3) learning videos, and ( 4) tests of higher order thinking skills. media \_ The learning method used is *Google*

*Classroom* , which is set so that it can be used as source study and means distribution ingredients teach, practice question and Duty. to College student which Becomes subject study with instrument study include: (1) instrument validity, ( 2) instrument practicality, and (3) instrument effectiveness.

### 3) Stage development

Designing a product at this stage is important. Next on Step this done validation device learning. Whole device learning and research instruments that have been compiled are validated by experts. Validator learning tools, learning media and research instruments consisting of: 2 validators. The validation results by experts are then averaged and the results are matched in accordance with category which has determined. Validation aim for know valid whether or not design product and appropriateness device learning for implemented on learning process. Validators \_ give a number of input and suggestion for improvement of learning tools, learning media, and research instruments has been compiled by researchers. The validator's input and suggestions become reference material in To do repair design product so that product which made could tested. Product which revised include: plan learning, Duty on line, videos learning, as well as test higher order thinking skills. Here 's what *Google Classroom* looks like by researchers and results validation of learning tools.

#### 1) Stage implementation

All products that have been made are then implemented in research trial subjects .The subjects of this development research are: education students mathematics class 1.2 semester 3 Faculty Tarbiyah and teacher UIN Alauddin Makassar. Application of learning *flipped classroom* with utilise google classroom , Theory Statistics Education on subject research as a material for discussion, distribution of materials, assignments and quizzes as well as a means of collection Duty. On Step implementation this implemented on date 24 September 2019 to October 15, 2019. Researchers ask for student responses after the implementation phase is carried out. The following is an overview of the implementation in class for: The first meeting.

##### a) I interaction on line pre class (phase 1)

Activity beginning is to prepare ingredients teach in the form of learning videos related to the size of the concentration material in the course education statistics. Teaching materials in the form of original learning videos made by students with the guidance of the lecturer so that students understand better with language which more easy understandable. In activity study videos learning made by students themselves with the guidance of the next lecturer in upload on *google classroom* , videos this uploaded 1 week before class started.

##### b) Activate study through online assignment assessment to start face-to-face learning (phase 2)

Uploading a learning video before uploading an online assignment for ensure college student learn videos defense. From Duty on line which given all college student which amount 36 people respond with send all the results of his work through *google classroom* . Response from all students show if they learn videos learning which shared.

##### c) I prepare college student in class (phase 3)

lecturer convey objective learning for Theory on The meeting was with the students ' *flipped classroom learning model* could:

#### 2) Determine average, media, and mode data single with correct. Stage implementation

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- a. Determine average, media, and mode data single with correct
- b. Solve contextual problems related to the mean, median, and data mode single correctly.

d) Reflection \_ material mastery (phase 4)

B rain storming is the beginning of learning. This matter aim for give perception which same to every college student. On Step this also served problem which will solved by studentwith basedraft which has been given to pre-class stage theory

e) Organize college student in group (phase 5)

College student grouped to in 8 group which consist on 5 College student in one group. Group which formed heterogeneous from academic review , gender and background cultural background.

f) College student work both online and offline various Duty (phase 6)

g) Demonstration results creation (phase 7)

The presentation was carried out after the discussion process. Process this looked at interesting so that college student could give description about his thoughts to all group which other. Communication which done this so thatthey could each other value and honor idea method complete problems for each group. At the time of the presentation, it was seen that students from each group enthusiastic respond every the problem that discussed.

h) Giving bait come back (phase 8)

At the end, the lecturer provides conclusions about the learning implemented and the lecturer provides material for the next meeting in the form of online

learning videos and assignments that are uploaded as reading material college student in House

### 3) Stage evaluation

Researcher To do evaluation/assessment formative for know ability high-level thinking of students after carrying out *flipped classroom learning* with utilise *google classroom* . After that, researcher share questionnaire to college student for know response college student to device *flipped classroom* with *google classroom*. could declared that average score response college student of 3.53 with a standard deviation of 0.20. As for the frequency distribution of the response scores college student after application method *flipped classroom* use *google classroom* on the learning process. it can be concluded that student responses the application of the *flipped classroom method* using *google classroom* is are in the positive category with an average of 3.53. Thus it can be said that the *flipped classroom learning method* using *google classroom* is in category practical

Results test ability think level tall college student own average as big as 80.56. Around 29 students or 80.55% of students are in the complete category and 7 students or 19.45% of students are in the incomplete category. This matter shows that in terms of the results of the higher-order thinking ability test then learning method *flipped classroom* use *google classroom* which developed is considered effective. With the percentage of student completeness that is 80.55% so method *flipped classroom* use *google classroom* said effective in terms of the results of the test of higher order thinking skills. This is in accordance with the results study (Cronhjort et al., 2018) that student which taught use *flipped classroom* get mark test which more good from which expected. *Flipped classroom* capable Upgrade results study student (Munir et al., 2018). Besides that, *flipped classroom* also give opportunity to student for involved active in learning (B. Lee, 2017).

## CONCLUSIONS AND SUGGESTIONS

Based on results study and discussion, researchers can draw conclusions that ;

- 1) All learning tools *flipped classroom* on category valid with validity Plan Learning get a value of 3.25; online assignments of 3.88; learning videos of 3.13; test higher order thinking ability of 3.25; student and lecturer responses of 3.63.
- 2) Response \_ college student is at on category positive with score average response college student reach 3.53 which show that whole device learning which developed is at on category practical
- 3) P percentage completeness students, which is 80.55%, indicates that the *flipped classroom method* uses *Google Classroom* is said to be effective in terms of level thinking ability test results tall.

## REFERENCES

- Abdullah, A. H., Mokhtar, M., Halim, N. D. A., Ali, D. F., clean, L. M., & kohar, U. H. A. (2017). *Mathematics Teachers 'Level of Knowledge and Practice on the 😊 of Higher-Order Thinking Skills ( HOT )* . 8223 (1), 3–17. <https://doi.org/10.12973/eurasia.2017.00601a>
- Bergmann, J., & sams, A. (2012). *Flip your classroom: Reach every student in every classevery day*. International Society for Technology in Education.
- Cronhjort, M., Filipsson, L., & Weurlander, M. (2018). *Improved engagement and learning in flipped-classroom calculus* . May 2017 , 113–121. <https://doi.org/10.1093/teamat/hrx007>
- Flaherty, JO, & Phillips, C. (2015). Internet and Higher Education The use of flipped

- classrooms in higher education : A scoping review . *The Internet and Higher education* , 25 , 85–95. <https://doi.org/10.1016/j.iheduc.2015.02.002>
- Hugerat, M., & Kortam, N. (2014). *Improving Higher Order Thinking Skills among freshmen by Teaching Science through Inquiry* . 10 (5), 447–454. <https://doi.org/10.12973/eurasia.2014.1107a>
- Johnson, GB (2013). *Student perceptions of the flipped classroom* . The University Of British Columbia.
- Kemristekdikti. (2018). *Science and Technology Development and Higher Education in the Revolutionary Era Industry 4.0* .
- Lee, B. (2017). *TELL us ESP in a Flipped Classroom* . 8223 (200), 4995–5007. <https://doi.org/10.12973/eurasia.2017.00978a>
- Lee, J., & Choi, H. (2017). What affects learner's higher-order thinking in technology-enhanced learning environments? The effects of learner factors. *Computers & Education* . <https://doi.org/10.1016/j.compedu.2017.06.015>
- Lee, K., & Lai, Y. (2017). *Facilitating higher-order thinking with the flipped classroom models: a student teacher ' s experience in a Hong Kong secondary school* . <https://doi.org/10.1186/s41039-017-0048-6>
- Maciejewski, W. (2016). *flipping the calculus classroom : an evaluative study* . December 2015 , 187–201. <https://doi.org/10.1093/teamat/hrv019>
- mohamed, H., & Lamia, M. (2018). Implementing flipped classroom that used an intelligent tutoring system into learning process. *Computers & Education* . <https://doi.org/10.1016/j.compedu.2018.05.011>
- Munir, MT, Baroutian, S., Young, BR, & Carter, S. (2018). Flipped classroom with cooperative learning as a cornerstone. *Education for Chemical Engineers* , 1–9. <https://doi.org/10.1016/j.ece.2018.05.001>
- Sojayapan, C., & khalaisang, J. (2018). Kasetart Journal of Social Sciences The effect of a flipped classroom with online group investigation on students' team learning abilities. *Kasetart Journal of Social Science* , 4–9. <https://doi.org/10.1016/j.kjss.2018.02.00>

