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Effectiveness of *Hybrid Learning* Model Against Student HOTS in Learning Microbiology at IKIP Budi Utomo

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Abstract

High Order Thinking skill (HOTS) students very needed during the COVID-19 pandemic. Objective study this is to determine the effectiveness of the hybrid learning model to High Tinking Order Skill (HOTS) students at the Microbiology MK at IKIP Budi Utomo. Method research used is quasi-experimental. The research subjects are IKIP Budi Utomo students who are currently studying go through eye studying microbiology in the even semester 2020/2021. Technical data analysis performed for know the distribution of research data with the n - normality test using the SPSS 16 program. The differences between the pretest and posttest values of the subject groups were tested. Differences in posttest scores, HOTS scores were analyzed using the General Linear Model (GLM) Multivariate SPSS 16 program. Research results show the average HOTS with hybrid learning (72.2727) is more tall compared to learning conventional (54.2857). Further test results show there is significant difference between the hybrid learning model and the conventional model against student HOTS. In conclusion, the hybrid learning model is effective in improve student HOTS in learning microbiology.

Keywords: Hybrid learning, High Order Ranking Skill, Microbiology

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INTRODUCTION

Education world moment this faced with the problem of the Covid-19 pandemic that hit in various countries. Existence closing schools and universities in Indonesia and even around the world have bother learning. United Nations organizations include *United Nations Educational, Scientific and Cultural Organization* (UNESCO) launches that, about 300 million students around the world are experiencing interference with activity activity learn at school (Erni et al. 2020) . The COVID-19 pandemic has caused high concern in various fields and joints life. With the COVID-19 pandemic, some college high in the world switch from learning *offline* to *online.* As research by (Novikov 2020) , sample study including student international year first from 12 found countries study learning consequence covid-19 pandemic, show that speed adaptation to online learning depends on various factor psychology and technology as ability study student.

The same thing happens in college tall especially IKIP Budi Utomo Malang, various problem education specifically activity learning arise problem. Among them transition activity learning from *offline* (offline) switch to *online* (online) requires adaptation that doesn't easy, limited availability source power human (HR) who have skill in the field information and technology, media, methods and learning models used. Problems that don't lost important is still low *high order thinking skills* (HOTS) of students in the pandemic era.

High order thinking skill (HOTS) is one of the skills life 21st century what every person needs individuals in the environment education especially in the environment Budi Utomo IKIP student. HOTS is a part of creative and critical thinking (Main, et al. 2020) . HOTS is thinking characterized by complex, multi - solution, involving decision creation and interpretation, application various criteria. HOTS is ability for apply fact into the situation new. Skills think level high (HOTS) will be appear in self someone who can associate information new with information that has been saved in her memory as well as connected information the for reach goal. HOTS as knowledge transfer is level highest from Skills think level tall in taxonomy Bloom's cognitive revised by Anderson & Krathwoll, which includes analytics, evaluation, and skills creative in cognitive processes. According to (Eliyasni, et al., 2019) HOTS is a part from ability thinking that involves processes in realm cognitive critical in solve problem. Based on opinion the *Higher Order Thinking Skills* (HOTS) consist of from ability think critical, ability be creative (*create)* and ability solve problem (*problem solving)*.

Graduate of institution teacher education is expected Keep going increase the HOTS organize and implement activity learn how to teach as practice skills that can more increase their HOTS future students (Rahayu. 2020) . Future teachers should also prepared for become a teacher who can practice student they Skills this. because of that, the teacher needs Skills think for help him student they for reach mastery Skills Required good in shape separate complex or integrated. That Integration various Skills think could done in shape Skills think practical. Empowerment skills 21st century including is HOTS on students important done, because with HOTS owned college student could managing, criticizing, and changing get information Becomes useful knowledge. Besides that as future teacher can easily transfer knowledge, choose method as well as media in activity learning.

Prepare source power reliable human as well as development policy education and development method as well as learning models need done. Model implementation learning based on technology namely Hybrid learning is one of the alternative right solution for problem above. Blended learning or " hybrid learning ", is one of the method innovative that has been succeed used in education tall and the place work (Bin Mubayrik 2018) . In line with (Shams, 2013) *Hybrid Learning* (HL) is approach learning that consists of from classroom learning traditional, learning computer - assisted language, and learning independent. Temporary according to (Andreeva et al., 2018) Learning mixture is combination from shape learning class traditional with method e-learning and by using technology education distance far which is interests and prospects main for development education contemporary by whole and for academic certain process by special.

Blended learning combines various learning activities including face-to-face, e-learning and independent learning, as well as learning distance learning supported by e-learning (Kacetl and Semradova. 2020) . Mixed learning (*blended/hybrid learning)* is a learning model that harmoniously combines the advantages of face-to-face learning (offline) with the advantages of online learning in order to achieve graduate learning outcomes (Nasrullah et al. 2017) . Learning with the *hybrid learning model* is carried out synchronously and asynchronously. Synchronous means being able to interact directly with students at the same time (Hartanto 2016) . Meanwhile for replace activity stare advance can use synchronous with technology online (Trung, Thu, and Tan 2012).

Hybrid learning model can increase student HOTS. Study previously by (Eliyasni, et al 2019) state that *blended learning* and PJBL models exist significant influence against student HOTS. Previous research by (Wahyuni, 2021) added that through the application of a hybrid learning model, it can be used as an alternative model to increase student motivation and learning outcomes in limited face-to-face learning. In addition, it is also strengthened by research (Fariska & Erman, 2017) Blended Learning can improve students' critical thinking skills on global warming material.

Besides problem resulting learning there is a covid-19 pandemic, student HOTS is still low for subject microbiology is problem separately needed solved. One of the factors

lowering student HOTS in courses microbiology caused evaluation more Emphasis on results study. This is reinforced by research (Maulia Fatimahtuzzahroh et al., 2021) Findings: The results show that the implementation of HOTs-based learning during the pandemic: 1) teacher knowledge about HOTS learning is quite good, 2) HOTS-based learning process planning is still not optimal, 3) The HOT-based learning process has not been implemented optimally. So that HOTS students increase as an alternative by implementing a hybrid learning model in learning microbiology. Based on background the back that has been displayed objective from study this is for know the effectiveness of the hybrid learning model on *High Thinking Order Skill* (HOTS) students at MK microbiology at IKIP Budi Utomo.

METHOD

Type research used is study experiment, that is for see the effectiveness of the *hybrid learning* model on HOTS students at the MK Microbiology at IKIP Budi Utomo. design research used is *pretest-posttest group design* (Fraenkel, Wallen, and Hyun 2012) . The place Study conducted at IKIP Budi Utomo Malang in the even semester 2020/2021 and the subject study is Budi Utomo 's Biology Education study program students who are currently studying go through eye studying microbiology. The instrument is arranged based on the reconstructed HOTS aspects, descriptions, and indicators and is used to organize the items. The development of the HOTS instrument adapts from the HOTS rubric from (Utama, et al., 2020). Data were analyzed using descriptive statistical tests to see the mean HOTS and inferential statistics were used to see differences in HOTS. The hypothesis test used the T test with a significant level of <0.05 to see the differences in the hybrid learning model on students' HOTS. Differences in posttest scores, HOTS scores were analyzed using the General Linear Model (GLM) – Multivariate SPSS 20 program.

RESULTS AND DISCUSSION

Summary of Descriptive statistical test results

Research results show HOTS average with *hybrid learning* model as big as 72.2727 more tall if compared to learning conventional amounted to 54.2857. as contained in table 1 below.

Table 1. Summary of statistical tests descriptive HOTS

Model	Mean	Std. Deviation	N
"*hybrid learning* "	72.2727	12,48857	22
conventional	54.2857	23,94769	21
Total	63.4884	20.82877	43

Based on Table 1, results *hybrid learning* model mean more tall compared to conventional models. This thing show that Through the *hybrid learning model* capable increase student HOTS in courses microbiology.

High Order Tinking Skill (HOTS) Homogeneity Test Results

Homogeneity test results obtained significance (p.level) is more big of 0.05 (p.0.05), p this show that H0 is accepted, so variant between data group no different or homogeneous. Homogeneity test summary contained in table 2 below.

Table 2. Results of HOTS Homogeneity Test

F	df1	df2	Sig.
2.378	1	41	.131

Statistical Test Results For Know Classification Between Classes Control By Treatment Class

Next for know significant influence Among control class and class treatment contained in table 3. The statistical test results show that there is significant influence between *hybrid learning* models on students ' HOTS abilities in subjects microbiology.

Table 3. Summary of Hypothesis Test Results related Influence *Hybrid Learning Model* on students ' HOTS ability

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	16782.774 [a]	2	8391.387	233.351	.000
Intercept	1918.321	1	1918.321	53.345	.000
pretest_HOTS	13306.679	1	13306.679	370.037	.000
strategy	2068.287	1	2068.287	57.516	.000
Error	1438.415	40	35.960		
Total	191544.444	43			
Corrected Total	18221.189	42			

Based on hypothesis test results obtained that Sig. 0.000 so that hypothesis study accepted and hypothesized zero rejected. There is an effect of the Hybrid Learning model on the HOTS Ability of Students in the Course microbiology. Next further test carried out for see level significance the effect of the Hybrid Learning model.

Table 4.Test Carry on The Effect of Hybrid Learning Model on Student HOTS ability

		Mean Difference			95% Confidence Interval for Difference [a]	
(I) strategy	(J) strategy	(IJ)	Std. Error	Sig. [a]	Lower Bound	Upper Bound
"hybrid learning"	conventional	13,965 *	1,841	.000	10,243	17.686
conventional	"hybrid learning"	-13,965 *	1,841	.000	-17.686	-10,243

Based on results data analysis is available significant effect by using a *hybrid learning* model to *high order thinking skills* (HOTS) of students in learning microbiology. As research that has been reported by (Eliyasni et al., 2019) that blended learning and learning based on Project influential and able Upgrade skills think level tall student (HOTS). This thing caused there is a number of excess capable *hybrid* learning affect student HOTS. According to (Yustina, et al., 2020) , The advantages of hybrid learning include : (1) Providing individual learning experiences ; (2) Support and encourage independence and collaboration learning ; (3) Increase the involvement of pre-service teachers in learning, and provide flexibility learn, whenever and wherever ; and (4) blended learning is significantly more effective in improving students' learning and science achievement process skills compared to conventional learning strategy. Study similar state that Blended learning contributes to Education quality, improve opportunity access and improvement of educational processes (Soler, et al. 2017) . Learning microbiology at Budi Utomo IKIP students who applied the hybrid learning model emphasizing the independent and collaborative process in solving problem, ok problem faced in context material (*content knowledge)* and problem faced related to online learning applications (*software). Hybrid learning* model could minimize the obstacles faced at the time learning *fully online.* There are several new problem can answered after done discussion stare advance because of Language and style also talk style teach lecturer When stare face in class also affects level understanding student. This is what causes the *hybrid learning* model to could increase student HOTS more tall compared to conventional models.

High order thinking skills (HOTS) are part from skills 21st century very important mastered student. HOTS indicator according to (Hajar et al., 2018) *high order thinking skills* include (1) analyzing (analyzing), where participant educate should capable decipher or detail a problem in shape question Becomes something more parts Specific from problem and able connect parts the ; (2) evaluate, in part this participant educate capable make consideration something conditions, methods or ideas; (3) Creating (creating), in Thing this participant educate should capable synthesize knowledge or information Becomes new knowledge.

Students who have *Higher Order Thinking Skills* (HOTS) will always think solution in face the problem that happened in life daily so that could master the era of the industrial revolution 4.0 or the digital era so that herself no will once replaced by machine but dominate machine. HOTS basically is level results study cognitive highest that is realm analyze, evaluate, and create (Sambite et al., 2019) .

Average HOTS is 72.2727 through hybrid learning more tall compared to learning conventional. This thing because through implementation of hybrid learning in learning microbiology carried out by *synchronous* and *asynchronous* where material can be accessed by free so that college student capable think creative based on a lot variety the information he obtained. Learn can done where only and when just without limited by space and time, things the allow activity learning microbiology more maximum because time flexible so that college student can *manage* time in study. According to (Nirahua, et al. 2020) The material can be accessed by free by students so that sued could study by independent because stored teaching materials online. Activity synchronous This is done using virtual zoom meeting media which is integrated in ed-link. Through zoom meeting you can increase student HOTS especially in the process of discussion solving problem. In line with research by (Aprilia, et al. 2020) , Utilization of PhET. virtual media could Upgrade *High Order Thinking Skills* student High school physics in learning Distance Far using zoom webinars.

Hybrid learning by utilizing technology information could used as a future learning model in accommodate skills 21st century. In line with (Nuraini et al., 2018) that blended learning is very useful in the future come, because liveliness student sued along shift paradigm as well as convenience look for information through the website for activity learning class. Implemented Hybrid learning model no only emphasis on technology online and offline learning but also emphasizes content knowledge in the form of problem the microbiology they see you in life real as well as various alternative solving the problem so student HOTS experience enhancement if compared to learning conventional. *Hybrid learning* model very in accordance implemented in learning microbiology carried out in the post- Covid-19 pandemic due to meeting stare advance (offline) implemented by limited so that need supported online learning. In implementation stare advance limited college student will got answer from questions those who haven't answered at the time online learning so that understanding and mastery draft they the more steady.

CONCLUSION

Based on results analysis and discussion could concluded effective implementation of hybrid learning in Upgrade *high order tinking skill* students in learning microbiology. Analysis result show there is significant effect of hybrid *learning* model against student HOTS. Hybrid learning model is preferable used as an alternative learning model in overcome problem education in college high during the covid-19 pandemic and in the future come.

RECOMMENDATION

In order to maximize skills 21st century student should study continued by developing a *hybrid learning* model combined with learning based on project.

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