BIOEDUSCIENCE
ISSN: 2614-1558
http://journal.uhamka.ac.id/index.php/bioeduscience

Blended-Contextual Teaching and Learning: How Is It Effective Against Learning Independence and Understanding of Student Concepts in Ecosystem Materials?

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Abstract

Background: Blended-Contextual Teaching and Learning combines contextual learning models with blended learning. The learning that is created is the concept of a contextual model where the teacher acts as a facilitator and moderator and does not tend to present something already finished to students. This analysis is aimed to determine the effectiveness of the Blended-Contextual Learning model on the freedom and understanding of the concepts of high school students in class X Ecosystem material. **Methods:** In this research, the quantitative research method was used using experimental research and research design, namely Quasi-Experimental Design, using an assessment instrument that has been tested for validity. The research was conducted at Madrasah Aliyah with a sample of 48 students. **Results:** Blended-Contextual Learning effectively increases the independence and students' conceptual understanding ability treated with the Blended-Contextual Learning model. **Conclusions:** Blended-Contextual Teaching and Learning has a practical effect because it has a positive influence on stimulating an increase in student's conceptual understanding, as seen in the data analysis above, which shows an increase in conceptual understanding in the treated class.

Keywords: Concept Understanding; Blended Contextual Teaching and Learning; Learning Independence

Article history
Received: 08 Aug 2022
Accepted: 16 Aug 2022
Published: 22 Aug 2022

Publisher's Note:
BIEDUSCIENCE stays neutral with regard to jurisdictional claims in published maps and institutional affiliations.

Citation:
Bangsa, L. Jayanti, U. 2022. Blended-Contextual Teaching and Learning: How Is It Effective Against Learning Independence and Understanding of Student Concepts in Ecosystem Materials?. BIOEDUSCIENCE, 6(2), 115-123. doi: 10.22236/j.bes/629691

Introduction

The COVID-19 pandemic has greatly affected lives economically, socially, culturally, and educationally. The main effect felt in education is preventing face-to-face learning in schools (Susanto, 2020). The Indonesian government has intensified efforts to prevent and handle COVID-19 by issuing a policy that requires educational institutions to implement online learning. This allows online learning to be applicable and requires the independence of teachers and students (Rozi & Lana, 2021). Online learning wants students to grow and develop independent skills (Armiati & Yanrizawati, 2020).

The most important factor that must be maintained in the COVID-19 pandemic situation is learning independence. If it is connected with students in learning, the student has initiative in learning independently and can take responsibility for their work. Students with good learning independence will be able to initiate themselves seriously in learning (Kurniawan et al., 2021). Student independence in learning is one of the factors of student success. If students have good learning autonomy, they will be more likely to be involved in learning activities at school (Sriyono, 2021). However, problems of learning independence still exist at the educational level, such as the impact on students' low learning potential, low student consistency, and involvement in others

to make decisions and carry out school tasks (Lestari et al., 2015).

Understanding concepts plays an essential role in student life. Hence, students' learning independence affects their ability to understand concepts, and student learning independence must be improved so they are well formed (Herwanto et al., 2020). The most important thing in the teaching process is to achieve the goal of allowing the student to understand something based on his educational experience. This ability to understand is fundamental because only through understanding can you acquire procedural knowledge. The concept that needs to be mastered by students in the subject of Biology is conceptual understanding, namely an understanding of the meaning of nature, a description of the theory and the ability to explain basic texts, schemes and phenomena related to the basic theory of conceptual science that is abstract (Mustofa, 2010). Therefore, there must be more significant changes in the learning model to help students anticipate the life problems they face now and in the future. External factors are learning approaches with basic steps in the teaching and learning process to achieve the desired goals (Irhami, 2019). The model that fits with the above conditions is Blended-Contextual Teaching and Learning.

Contextual learning is an educational concept that assumes that children will learn better if the environment is created scientifically, which means that learning will be more beneficial if the child not only 'knows' but also 'experiences' what he is learning. In this case, the student needs to understand what learning is, its benefits, at what level, and how it is achieved. They realize that learning will be beneficial to their future lives. In this way they will learn to become more motivated and mindful. Contextual learning is an educational theory that encourages teachers to relate the guided material to concrete situations for students and bring students to make connections between their knowledge in everyday life (Al-Tabany, 2017). Contextual learning occurs when students experience what they are learning by assigning to everyday life problems related to their roles as family, citizen, student, and workforce (Johnson, 2009). The principle of learning from a contextual approach is to facilitate students' understanding of subjects and expand students' creative thinking so that students can connect knowledge with real life.

The model applied in this study is Blended-Contextual Teaching and Learning. Graham et al. (2005) define the concept of blended as a blend of interactive learning media, a blend of design or teaching and learning methods, and a blend of online learning and face-to-face learning. In its application, a practical assessment process is carried out through models that can help students achieve their learning goals, one of which is the achievement of maximum learning outcomes. Blended learning can be described as a learning program in which more than one mode of delivery is used to optimize learning outcomes and program delivery costs (Singh & Reed, 2001).

Another definition of blended learning is the effective integration of various learning techniques, technologies, and delivery modalities to meet specific communication, knowledge sharing, and information needs (Finn & Bucceri, 2008). Garner (2017) stated that blended learning is a structured learning zone that aims to maximize learning outcomes. Implementing blended learning also intends to develop students' independent learning experiences (Darma et al., 2020). Blended learning is the integration of the online teaching and learning process and the face-to-face teaching and learning process by using different media as tools to implement this blended learning. Blended learning also seeks teachers to make instruction to improve student performance and academic engagement (Watson et al., 2020).

This study aims to determine the effectiveness of Blended-Contextual Teaching and Learning on the independence and understanding of the concepts of class X students in learning ecosystem materials. The formulation of the problems found in this study are: (1) how the effectiveness of Blended-Contextual Teaching and Learning on the learning independence of class X students of ecosystem materials; and (2) how is the effectiveness of Blended-Contextual Teaching and Learning on the understanding of class X students'

concepts in ecosystem materials? The results of this study are expected to provide information on substitution learning models that can overcome independence in student learning and understanding concepts that can be overcome with biological concepts, especially ecosystem materials.

Methods

This research method is a descriptive quantitative method that uses a type of experimental research and research design, namely Quasi-Experimental Design. Experimental research is described as a study method applied to find the effectiveness of some treatments against other treatments in resolved situations (Sugiyono, 2012).

Table 1. Blended Contextual Teaching and Learning model syntax

Blended-Contextual Learning model Syntax	Stage Learning	Implementation
Preparation	Introduce students to learning objectives on how to learn through an online program.	Offline
Presentation	Describes synchronous and asynchronous learning. Describes the use of portals for online learning activities	Online
Demonstration	Teaches students to manage an already created online portal. Teach students to study the material on the portal	Online
Practice	Guiding students to practice using the online portal Discussion groups are welcome to lead the percentage during the question-and-answer period	Online
Evaluation	Assess the summary of the evaluation of learning methods presented in class based on the results of discussion of learning materials	Online
Support	Observe students and discussion groups as they understand the presentation material	Offline
Coach me	Teaches students to understand the learning material which can then be reapplied to the discussion group	Offline
Collaboration	Give directions to students to complete worksheets in groups.	Offline

This research was conducted in the even semester, precisely in March of the 2021/2022 school year. The research was conducted at one of the Aliyah Madrasahs in Langkat Regency used consisted of 48 students of Madrasah Aliyah. Before sampling, the population was tested for equality between test samples. The sample was determined using Cluster Random Sampling where, according to Margono (2009), the sampling technique used if the population consists of groups, not individuals. This sampling technique is to create random numbers, collect samples from five classes in class X, and select several classes to be used as experimental classes with a Blended-Contextual Teaching and Learning model and a control class with a conventional learning model as a treatment sample.

This research instrument is a conceptual understanding test using multiple choice questions totaling 50. The instrument has been validated with the result of the validity of Rhitung = 0.726. In the research, a learning model will be applied, namely the Blended-Contextual Teaching and Learning model. The results of this study were obtained from the initial ability test data, namely using pretests and posttests regarding the understanding of concepts in student learning, as well as using pretests and posttest

questionnaires for student learning independence. The data will be deciphered using normality, homogeneity, N-Gain, and t-test tests. All statistical calculations are calculated using Microsoft Excel and SPSS 22.

Table 2. Categorization of N-Gain Coefficient Values

Normalized gain value (g)	Criteria
g > 0,70	High
0,070≥ g ≥ 0,30	Medium
g < 0,30	Low

Result

Student Learning Independence

Based on data analysis that shows the average results of pretests and posttest of experimental classes (Blended-Contextual Teaching and Learning) and control classes (conventional) on student independence can be seen in Figure 1. The average score of the experimental class students' blended-contextual teaching and learning independence test (Blended-Contextual Teaching and Learning) is 46.11, with a minimum score of 42.59 and a maximum of 50.74 with a standard deviation of 2.81. Meanwhile, the control class (conventional) average is 36.16, with a minimum score of 29.62 and a maximum of 43.70 with a standard deviation of 3.85 (Figure 1).

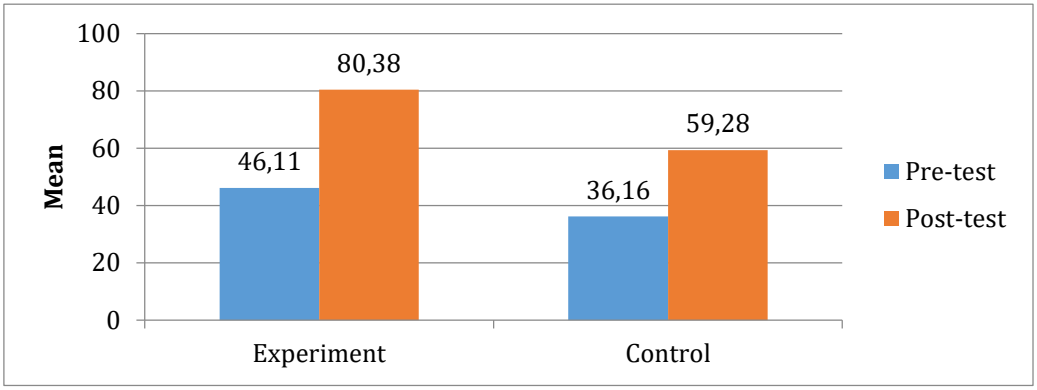

Figure 1. Average results of pretest and posttest from experimental and control classes

The average score of the posttest of learning independence of experimental class students (Blended-Contextual Teaching and Learning) is 80.38, with a minimum score of 73.70 and a maximum of 90.34 with a standard deviation of 5.06. While the average score of the control class (conventional) is 59.28, with a minimum value of 42.22 and a maximum of 71.11 with a standard deviation of 6.81. Data analysis from student questionnaire data on learning independence using N-Gain analysis showed a conventional and Blended-Contextual Teaching and Learning model of student learning independence (Table 3).

The calculation results of the N-Gain test score above show that the average value for the experimental class (Blended-Contextual Teaching and Learning) is 63.99% based on the coefficient value criteria (Hake, 2002) included in the category of very effective. An N-Gain score of at least 54.19% and a maximum of 80.39%. Meanwhile, the average N-Gain control class score (conventional) is 36.08% based on the coefficient value criteria (Hake, 2002), belonging to the ineffective category. An N-Gain score of at least 11.36% and a maximum of 54.79%. This proves that using the Blended-Contextual Teaching and Learning model effectively increases student learning independence in ecosystem materials.

In conducting hypothesis tests, the data obtained are prerequisite testing first. Prerequisite test results include normality test and homogeneity test. The results of the pretest analysis of the experimental class (Blended-Contextual Teaching and Learning) and the control class (continental) showed the Sign value in the normality test, namely Sign > 0.05. For the experimental class with a value of 0.926 > 0.05 and the control class with a

value of 0.927 > 0.05. Thus both data are normally distributed, both experimental classes and control classes. Then, homogeneity testing with Sign FCount < FTabel, which is 0.537 < 2.058, thus the pretest data between the experimental class and the similar or homogeneous control class.

Table 3. N-Gain Test Analysis of Learning Independence

Student Learning Independence Statistics	N-Gain Score	
	Experiment Group	Control Group
Mean	63,99	36,08
Median	62,16	37,35
Range	26,20	43,42
Maximum Score	80,39	54,79
Minimu Score	54,19	11,36
Standard Deviation	7,80	10,65
Variance	60,98	113,57

The results of the posttest analysis of the experimental class (Blended-Contextual Teaching and Learning) and the control class (conventional) showed the Sign value in the normality test, namely the Sign > 0.05. For the experimental class with a value of 0.915> 0.05 and the control class with a value of 0.956 > 0.05. Thus both data are normally distributed, both experimental classes and control classes. Then, homogeneity testing with Sign FCount < FTable, which is 1,550 < 2,058, thus the pretest data between the experimental class and the similar or homogeneous control class.

The results of the hypothesis test that explain the independence of student learning by applying the Blended-Contextual Teaching and Learning model are better than students with conventional models (Table 4).

Table 4. Results of the Independent Sample t test on Learning Independence

Posttest student learning independence	t-test for Equality of Means			Conclusion
	t	df	Sig (2-tailed)	
Equal Variances Assumed	12,087	46	0,00	H_0 rejected

The results of the data above show that count = 12,087 > ttabel = 1,678 with a significant level of 5%, then the hypothesis that explains independence in student learning with the Blended-Contextual Teaching and Learning model is higher than that of students with conventional learning models. The results of the pretest and postes data from both classes obtained a 2-tailed significance value of 0.00<0.05, so a significant difference in point scores was seen between the control group and the experiment. From the data analysis above results, it is known that the Blended-Contextual Teaching and Learning model on ecosystem materials is effective or affects independence in the way students learn for Ecosystem materials.

Independence in the way of learning is the concept of how an individual can become a self-leader in his learning activities. The advantages of the Blended-Contextual Teaching and Learning model can foster student independence in learning. So that this model is effective to be applied so that student independence is well stimulated, advantages like this will make students' interest in learning also increase because there is an awareness in themselves that independence in learning is something important for learning objectives achieved with effectiveness and efficiency (Sugiyono, 2014).

Understanding Student Learning Concepts

The average score of the concept understanding test of the experimental class students (Blended-Contextual Teaching and Learning) was 34.45, with a minimum score of 10 and a maximum of 80 with a standard deviation of 16.82. Meanwhile, the control class

(conventional) average score is 25.65, with a minimum value of 10 and a maximum of 50 with a standard deviation of 13.42 (Figure 2).

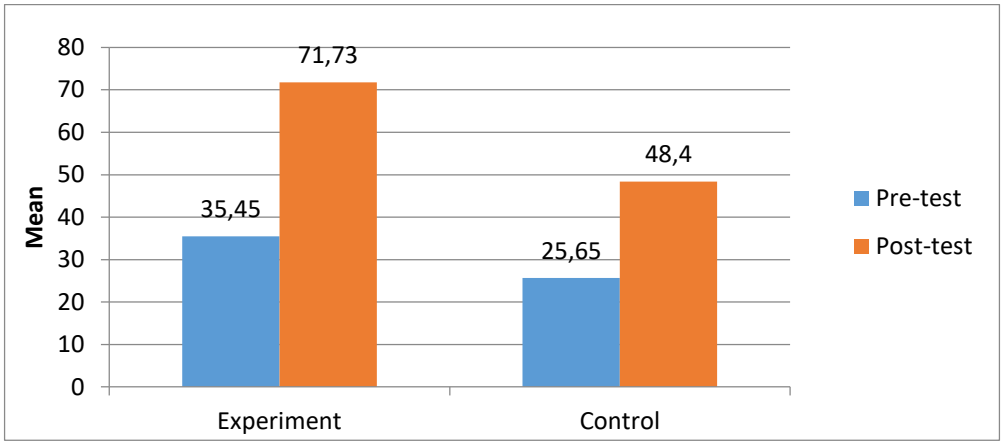

Figure 2. Average results of pretest and posttest from experimental and control classes

The average results of students' concept understanding postes showed that the average score of the experimental class postes (Blended-Contextual Teaching and Learning) was 71.73, with a minimum score of 40 and a maximum of 100 with a standard deviation of 18.00. While the average score of the control class (conventional) is 48.4, with a minimum value of 10 and a maximum of 70 with a standard deviation of 13.44.

Data analysis resulting from student questionnaire data on the understanding of learning concepts using N-Gain analysis shows conventional and Blended-Contextual Teaching and Learning models on understanding student learning concepts.

Table 5. N-Gain Test Analysis Understanding of student learning concepts

Student Learning Independence Statistics	N Gain Score	
	Experiment Group	Control Group
Mean	58,87	28,36
Median	71,42	28,57
Range	150,00	55,56
Maximum Score	100,00	55,56
Minimum Score	-50,00	0,00
Standard Deviation	43,05	18,03
Variance	1854,10	325,15

The calculation results of the N-Gain test score above show that the average value for the experimental class (Blended-Contextual Teaching and Learning) is 58.87% based on the coefficient value criteria (Hake, 2002) is included in the category of quite effective. With an N-Gain score of at least 50% and a maximum of 100%. Meanwhile, the average N-Gain control class score (conventional) is 28.36% based on the coefficient value criteria (Hake, 2002), belonging to the ineffective category. With an N-Gain score of at least 0% and a maximum of 55.56%. This proves that using the Blended-Contextual Teaching and Learning model effectively increases student learning independence in ecosystem materials.

In conducting hypothesis tests, the data obtained are prerequisite testing first. Prerequisite test results include normality test and homogeneity test. The results of the pretest analysis of the experimental class (Blended-Contextual Teaching and Learning) and the control class (continental) showed the Sign value in the normality test, namely Sign > 0.05. For the experimental class with a value of 0.915 > 0.05 and the control class with a value of 0.920 > 0.05. Thus both data are normally distributed, both experimental classes and control classes. Then, homogeneity testing with Sign FCount < FTable, which is 1,570 < 2,058, thus the pretest data between the experimental class and the similar or homogeneous control class.

The results of the postes analysis of the experimental class (Blended-Contextual Teaching and Learning) and the control class (conventional) showed the Sign value in the normality test, namely Sign > 0.05. For the experimental class with a value of 0.945 > 0.05 and the control class with a value of 0.922 > 0.05. Thus both data are normally distributed, both experimental classes and control classes. Then it was tested by homogeneity testing with Sign FCount < FTabel, which is 0.962 < 2.058, thus the pretest data between the experimental and control classes is similar or homogeneous.

The results of the hypothesis test, which states that understanding student learning concepts using the Blended-Contextual Teaching and Learning model is better than students with conventional learning models, can be observed in Table 6:

Table 6. Results of the t-test on Student Concept Understanding

Post-Test Student Concpet Understanding	t-test for Equality of Means			Conclusion
	t	df	Sig (2-tailed)	
Equal Variances Assumed	6,918	46	0,00	H0 rejected

Discussion

The results of the data above show tcount= 6.918 > ttable = 1.678 with a significant level of 5%. The hypothesis states that understanding concepts towards student learning with the Blended-Contextual Teaching and Learning model is better than students with conventional models. The results of data analysis from both classes obtained 2-tailed significance results, namely 0.00<0.05, so a significant difference in point scores was seen between the control group and the experiment. From the analysis of these data, the results were obtained that the Blended-Contextual Teaching and Learning model on Ecosystem material is effective or has an influence on the understanding of student learning concepts in Ecosystem material.

The results of this study are in line with Rahmadi (2022) who reported that there was an increase in learning outcomes by 7.76% in cycle I and 17.9% in cycle II, as well as the impact of blended learning using a flipped classroom approach with contextual learning methods on improving learning outcomes. Therefore, it can be said that blended learning with contextual learning methods with a flipped classroom approach increases understanding of the concept of student learning outcomes (Putra. Fernandez & Aprilindo, 2016). Contextual learning (CTL) approach can be successful, if learning uses collaborative interactions with students, a high level of activity in lessons, connection to real-world contexts, and integration of science content. With content of other fields and skills (Selvianiresa & Prabawanto, 2017)

Learning biology as a component of education to play an essential role in the quality of talents that work critically, innovatively and creatively to help with daily problems and other disciplines of science (Baru & Mawartiningsih, 2018). This is relevant to the content standards according to the Regulation of the Minister of National Education (Permendiknas) Number 22 (2006) and the process standards according to the Minister of National Education Number 19 (2005) which in the learning process science is related to how to find out (inquiry) about nature systematically, so that science is not a mastery of a collection of knowledge in the form of facts, concepts or principles only, but also a process of discovery (Martaida, 2017). Therefore, the application of the Blended-Contextual Teaching and Learning model has the advantage of more efficient and effective learning, having access that makes it easier for students to understand learning materials, students' freedom to learn the topic of the material independently, and having the opportunity to exploit the material available online (Amin, 2017).

It was also said by Anggraeni et al. (2019) in the study that the advantages of applying the Blended-Contextual Learning model can strengthen students to learn anytime and anywhere. The student can independently understand the material he is studying.

Blended-Contextual Teaching and Learning can also add decision-making skills for students. In the Syntax of Blended-Contextual Teaching and Learning, there is a syntax of Inquiry, Questioning and Contructivism, where the syntax trains students in independence to find answers in the media or situations given by the teacher. In understanding the concept, there is a syntax in the Learning Community syntax. In this syntax, students are guided to understand the problems in a discussion group to find each other and understand the answers that have been obtained from the results.

The ability of a person to understand or understand after knowing and remembering something is called concept understanding (Suryani, 2019). The advantages of the Blended-Contextual teaching and learning model can stimulate an increase in students' understanding of concepts as seen in the data analysis above which shows an increase in understanding concepts in the classroom given the Blended-Contextual Teaching and Learning model treatment.

Conclusions

The results of this study support the provision of blended-contextual teaching and learning model interventions in the learning process to increase student learning independence. Thus, high learning independence makes students' interest in learning also increase because there is an awareness in themselves that independence in learning is something important for goals that are achieved effectively and efficiently. Blended-Contextual Teaching and Learning has an effective influence because it has advantages that can stimulate an increase in students' understanding of concepts. Thus, researchers suggest that teachers to apply Blended-Contextual Teaching and Learning as an alternative learning model to create learning that facilitates students to be independent in learning and understand the concepts of biology well. Thus, further research is needed to address or answer the limitations of this study. The results of this study can be considered as a result of the implementation of the learning process with the Blended-Contextual Teaching and Learning model; namely, learning in this model is one of the means for students to improve their ability to understand student concepts and provide learning independence questionnaires to determine the level of student learning independence.

Declaration statement

The authors reported no potential conflict of interest

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