Studies in Learning and Teaching
Homepage: https://scie-journal.com/index.php/SiLeT
Email: silet@scie-journal.com

p-ISSN: 2722-399X; e-ISSN: 2722-1857
SiLeT, Vol. 3, No. 1, April 2022: 62-73

Student's Concept Understanding and Motivation to Learn Through Flipped Classroom Learning Integrated with Nested Model

***A J Gitadewi[1], Prabowo[2], Z A I Supardi[2], W Maryuni[3]**
[1]Magister Science Education Program, Postgraduate Program, Universitas Negeri Surabaya, Indonesia
[2]Department of Physics, Faculty of Mathematics and Natural Science, Universitas Negeri Surabaya, Indonesia
[3]Junior High School 21 Surabaya, Jambangan, Surabaya, Indonesia

Article Info

Article history:

Received March 31, 2022
Revised April 18, 2022
Accepted April 26, 2022
Available Online April 30, 2022

Keywords:

Concept understanding
Flipped classroom
Motivation to learn
Nested model

ABSTRACT

This research aimed to describe the effectiveness of the flipped classroom integrated with nested model in student's concept understanding and motivation to learn. The research type is quasi-experiment with one-group pretest-posttest design. The research was given to 20 students in VII-D class of SMPN 21 Surabaya. The effectiveness of the flipped classroom integrated with nested model was obtained from the results of a concept understanding test and a motivation to learn questionnaire. The student's concept understanding test showed that there was an improvement in gain scores between the pretest and posttest scores which is medium category and 90% of students were declared complete. Meanwhile, the gain score on the completeness of the concept understanding indicator was high category. Then the results of the student's motivation to learn showed that there was an improvement in gain scores between pretest and posttest which is medium category. The data obtained that flipped classroom integrated with nested model was effective as a learning instrument to improve student's concept understanding and motivation to learn during the Covid-19 pandemic.

https://doi.org/10.46627/silet

INTRODUCTION

The Covid-19 pandemic can cause many impacts on various aspects of Indonesian people's lives, including education. The positive cases of Covid-19 prompted the government to make several new policies. The health of students, teachers, lecturers, and the other teaching staff is a consideration, so face-to-face learning activities in all schools and universities must be closed and switched to an online system. In learning, both online and face-to-face, motivation is the main factor in science learning (Chan & Norlizah, 2018). To make science learning effective, students should have motivation towards science learning.

Based on research conducted by Cahyani et al. (2020) shows that motivation to learn of students who join online learning during Covid-19 pandemic has decreased. The result of that research is in line with Kohli et al. (2021) that stated the lack of motivation due to stress by the pandemic was another recurrent time. Motivation to learn decreased as a negative impact of online learning also occurs in students of SMPN 21 Surabaya. Based on the results of the questionnaire, it is known that the motivation to learn of individual students is still low. The low motivation to learn in online learning during Covid-19 pandemic certainly has an impact on concepts understanding. Based on the student's observation questionnaires, 73.1% of students stated that it was difficult to understand the lesson during online learning. It is also in line with the research of Nawastheen & Perera (2021) which stated that 22.7% of students felt

https://doi.org/10.46627/silet.v3i1.105

they were not helped in understanding concepts during online learning. According to them, this is because as many as 53% of students were concerned that they were not able to discuss subject matter with their peers. Yadav et al. (2021) also stated the same thing, that online learning process can cause a lack of interaction from the student.

Dastidar (2021) states that science students get low satisfaction with online learning environments. They argue that it is difficult to construct knowledge or understand concepts virtually. This can be caused by online learning which tends to be Unidirectional interaction and technically (only give some assignments), it means that the teacher does not involve directly in explaining the material, even though it is also very important to avoid misunderstandings and misconceptions among students. The result of concept understanding test in the pre-research, it is known that from 25 students and 6 indicators of concept understanding, only 1 student almost completes all indicators of concept understanding. To create effective study at home, the latitude of choosing models, methods, and media in online learning should be a good consideration. Teachers can combine several learning models that mix with the needs of online learning. The existence of several obstacles in online learning based on the result of the interview, questionnaire, and literature study can be overcome by one of the learning models that can be applied which is flipped classroom.

The flipped classroom model is a learning model that is the opposite of the learning model usually applied by teachers in the classroom. Usually, teachers explain material using the lecture method in the class and then give assignments at home as a follow-up, but in flipped classroom students will be given material first from digital module or learning video that must be watched and understood, then doing assignment in the class with the teacher and other students. Based on research conducted by Herala et al. (2015) in Nouri (2016) stated that the use of flipped classroom can improve student learning outcomes because through this learning students can focus on reviewing material without a set time, and learning time can be maximized to solve actual problems encountered by students. Garza (2014) quoted from Boucher et al. (2013) also said that learning with the Flipped Classroom model will have more time to interact and clarify the material, more time to explore concepts, and more time to achieve learning objectives. Bawaneh and Moumene (2020) added in their research that the flipped classroom has a positive effect on motivation to learn.

Learning activity should not only memorize the concepts or facts but also connect other concepts and skills to build a complete understanding so that the learning activity will be meaningful, the concepts well understood, and not easily forgotten. A learning model that provides meaningful learning to students is integrated learning, one of which is nested. Based on research conducted by Tangkearung and Lolotandung (2020), using nested learning model can improve student learning outcomes because students can think more creatively and the teacher acts as a facilitator and is not domineering so that students are required to be more active in their learning activity. The same result was also obtained by Omes and Suyono (2020) that learning with nested type of integration can affect critical thinking skills and student's concept understanding.

Nested integration centered on the skills and learning experiences of each student can be combined with the flipped classroom because their classroom activities are student-centered. So both of them are emphasizing active learning, where the teacher helps the student and not only provides information; this makes them self-directed learners. Therefore, some of the benefits of the flipped classroom are improving attention, verifying the learning, allowing for self-assessment, making decisions about what, how, when, and they learn by assuming commitment and responsibility (Limaymanta et al., 2021). These advantages are also in line with the core of learning with nested integration. Online learning in the Covid-19 pandemic emergency using the nested integration model can be carried out together with the flipped classroom model. Through the combination of the two, it is expected to be effective in helping students to be motivated in learning and have a good understanding of concepts even though learning is done

https://doi.org/10.46627/silet.v3i1.105

with an online system. Based on the explanation above, the researcher intends to find out the motivation to learn and concept understanding through flipped classroom learning integrated with nested model.

RESEARCH METHOD

This research used a quantitative approach with the experimental research method type quasi-experimental design. The research was conducted using one-group pretest-posttest design because this research used one group without a comparison group. The design is described as follows:

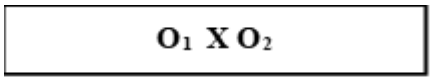

Figure 1. One-group pretest-posttest design

(Sugiyono, 2017)

The research was held on 20 students VII-D class of SMP Negeri 21 Surabaya in the 2020/2021 academic year on heat and transfer material. Data analysis techniques used in this research are:

1. **Student's Concept Understanding**

   The improvement of student concept understanding of heat and transfer material is obtained through the calculation of individual completeness, classical completeness, and indicators of concept understanding completeness.

   a. Individual Completeness

      The score is obtained from the scoring of each question number. For multiple-choice questions, a maximum score is 5, while if it is incorrect the score is 0. For description questions, a maximum score is 10, while if it is not answered the score is 0. Then the scores are added up entirely. The result of the individual concept understanding test is categorized to be "complete" if students get a score > 75 which is the limit value of the Minimum Completeness Criteria (KKM) for science subjects.

   b. Classical Completeness

      Classical completeness can be analyzed using quantitative descriptive analysis. Classical completeness is obtained using the following formula:

$$Classical\ completenes = \left(\frac{\sum students\ whose\ the\ score\ is\ complete}{\sum all\ students} \times 100\%\right)$$

      Learning using flipped classroom integrated with nested is categorized to have achieved classical completeness if it obtains > 85% of students who completed individually (Permendikbud RI, 2014).

   c. Completeness of Concept Understanding's Indicator

      The percentage (P) of completeness of concept understanding's indicator can be obtained by the following formula:

$$P = \left(\frac{\sum score\ that\ obtained\ of\ each\ indicator}{\sum maximum\ score\ of\ each\ indicator}\right) \times 100\%$$

      An indicator concept understanding is categorized to be "complete" if the percentage (P) of each indicator reaches > 75%.

   Then, to find out the improvement of student's concept understanding of heat and transfer material, both from individual completeness and indicators completeness, N-Gain calculations are carried out with the following formula:

$$N - Gain = \frac{(posttest\ score - pretest\ score)}{(maximum\ score - pretest\ score)}$$

   The result of that calculation is then determined by the category based on the improvement value between pretest and posttest through the following assessment criteria:

https://doi.org/10.46627/silet.v3i1.105

Table 1. Interpretation of concept understanding improvement

Range	Category
N-Gain > 0.70	High
0.30 < N-Gain ≤ 0.70	Medium
0.30 ≥ N-Gain	Low

(Hake, 1999)

2. Student's Motivation to Learn

Student's motivation to learn is obtained through filling out the questionnaire that has been provided and then filled by students according to themselves. The score criteria use a Likert scale calculation shown in the following table:

Table 2. Criteria for student's motivation to learn score

Rating	Score
Strongly Agree	4
Agree	3
Disagree	2
Strongly Disagree	1

(Modified from Riduwan, 2013)

After all scores were summed up, then converted into the value of student's motivation to learn with the formula:

$$The\ value = \frac{student's\ motivation\ score}{maximum\ score} \times 100$$

The calculation of student's motivation learning value is used to calculate the value of the pretest and posttest from motivation questionnaire. Then to find out the improvement of student's motivation to learn on heat and transfer material through flipped classroom integrated with nested learning, N-Gain calculations were carried out.

The result of this calculation is used to determine the category of the improvement of motivation to learn between pretest and posttest through assessment criteria such as Table 1. Based on table 1, it can be seen that the improvement of student's motivation to learn can be low, medium, and high. Learning based on flipped classroom integrated with nested on heat and transfer material is categorized as feasible if it shows an improvement in student's motivation to learn.

Furthermore, to find out the correlation between concept understanding and motivation to learn, a calculation was carried out using the product-moment formula (Riduwan, 2013) as follows:

$$r_{xy} = \frac{\sum(x_i - \bar{x})(y_i - \bar{y})}{\sqrt{(\sum(x_i - \bar{x})^2) - (\sum(y_i - \bar{y})^2)}}$$

r_{xy} : correlation coefficient between variables X and Y
x_i : score of variable X data i
y_i : score of variable Y data i

The result of this calculation is categorized to be significant or there is a correlation if r_{xy} is greater than r_{table}.

RESULTS AND DISCUSSION

The result of this research was divided into two aspects:

1. Student's Concept Understanding

a. Individual and Classical Completeness

The effectiveness of flipped classroom integrated with nested is obtained from the improvement of concept understanding of heat and transfer material based on pretest

https://doi.org/10.46627/silet.v3i1.105

and posttest score. The improvement of student's concept understanding is presented in table 3 below:

Table 3. Student Concept Understanding Data

	Mean			Category
	Pretest	**Posttest**	**N-Gain**	
	49	82	0.65	Medium
Completeness Value	0%	90%		

Based on the N-Gain analysis in table 3, the percentage of classical completeness after learning using flipped classroom integrated with nested model is 90%. It means that flipped classroom integrated with nested model can improve student's concept understanding in heat and transfer material with complete category classically. In addition, there was an improvement of gain score which is 0.65 with a medium category. It shows that flipped classroom integrated with nested model is effective to improve concept understanding in each student. Figure 2 below shows the improvement of student's pretest and posttest scores based on concept understanding test.

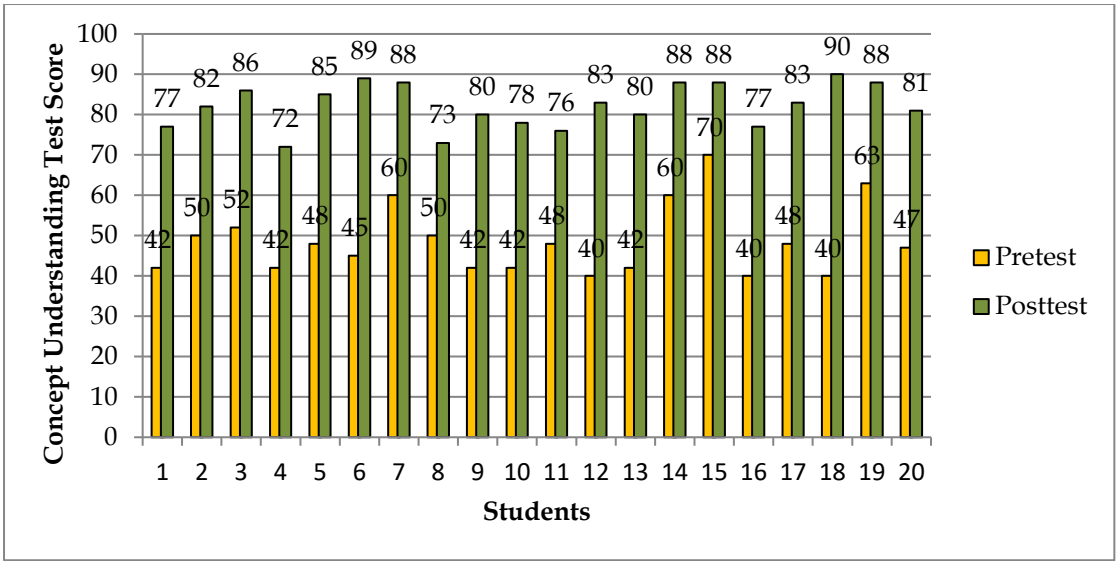

Figure 2. Graph of pretest and posttest of student's concept understanding

The lack of student's concept understanding during online learning caused by students being unable to discuss subject matter with their peers, unidirectional interaction from teacher, and learning technically (only giving some assignments) became one of the focuses of discussion in this research. The improvement of student's concept understanding is affected by the success of learning instruments that is also supported by learning activities. Based on research conducted by Dastidar (2021) on science students, it is difficult to construct knowledge or understand concepts virtually, because experimental and simulation activities are required for understanding the concepts while this is not done in online classes. Flipped classroom integrated with nested as learning model is directed first at activities that involve several skills and then leads to concepts. Therefore, students should do virtual experiment activity and watch experiment video first so that in the end they can strengthen their concept understanding of heat and transfer material. The implementation of nested model in this research is in student worksheet based on nested approach, because it can be used to improve science learning abilities because it trains students to carry out scientific thinking processes, so they can understand the subject matter properly and correctly. This emphasizes providing direct experience to develop competence and gain a meaningful

https://doi.org/10.46627/silet.v3i1.105

understanding, in accordance with the nature of science learning. With that learning model, learning activities become more meaningful and students can understand concepts well or not just memorize them.

Anderson and Krathwohl (2010) stated that the most important educational goals are retention and transfer. The educational goal that is in line with this research is transfer, because this ability is needed to prepare 21st-century thinking skills. Retention is the ability to remember the subject matter for a certain period of time, while transfer is the ability to use the material that has been learned to solve new problems. One of the learning scenarios that can be applied to achieve the transfer goal is implementing meaningful learning (Anderson & Krathwohl, 2010). Meaningful learning presents the knowledge and cognitive processes that need to solve problems. In line with the learning theory proposed by Ausubel, meaningful learning will be remembered longer because the information is learned meaningfully, and information gotten from meaningful learning can facilitate the next learning process for similar subject matter.

This result is also suitable with the view of constructivism theory that if knowledge is built by the learner himself, it will meaningful so the knowledge will be easy to remember and easily transferred. In addition, it is also in line with the cognitive theory by Jean Piagett that through real experience, the cognitive development of students will be better than just using language to communicate, so it can improve student's ability to solve problems and can improve motivation to learn. Mutoharo et al. (2015) stated that student's motivation to learn science had a significant contribution to understand the science concepts.

b. Completeness of Concept Understanding Indicator

The result of student's concept understanding was also analyzed for each indicator of concept understanding that was used. The improvement of student's concept understanding of heat and transfer material based on the completeness of the indicators of concept understanding is presented in the following table:

Table 4. The data of concept understanding improvement indicators

Indicators of Concept Understanding	$X_{pretest}$	$X_{posttest}$	*N-Gain*	Category
Restate a concept	42	87	0.78	High
Classifying objects according to certain properties and according to the concept	38	85	0.76	High
Give examples and non-examples of the concept	53	93	0.85	High
Presenting concepts in the form of mathematical representations	53	80	0.57	Medium
Using, utilizing, and selecting the certain procedures or operations	31	83	0.75	High
Applying concepts or algorithm as problem solving	70	88	0.60	Medium
Mean			**0.72**	**High**

Based on table 4, it shows that the indicators of concept understanding that used as a measurement, has improvement based on a gain score which is 0.72 with high category and all indicators have obtained a final completeness percentage > 85% so it can be categorized as "complete". It shows that flipped classroom integrated with nested model is effective in completing all indicators of concept understanding. Figure 3 below shows the improvement of pretest and posttest score based on indicators of concept understanding score.

https://doi.org/10.46627/silet.v3i1.105

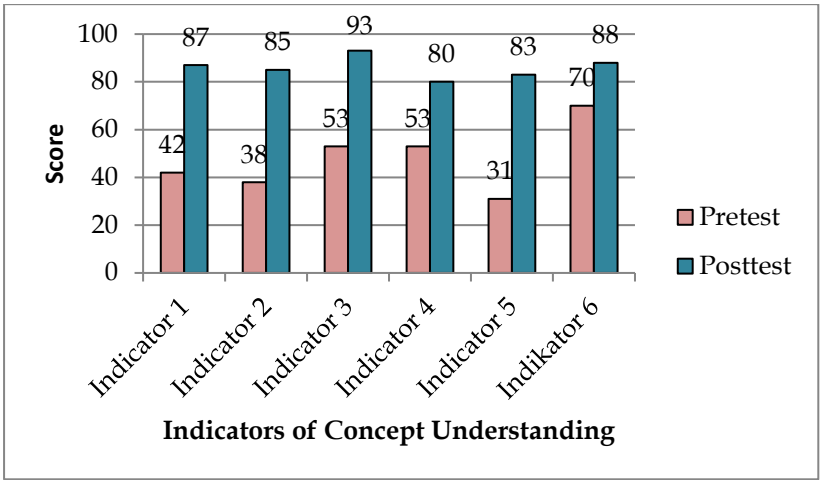

Figure 3. Graph of The Improving of Understanding Concept Indicators

Based on the improvement of concept understanding result in terms of individuals and each indicator of concept understanding, completeness in terms of individual, classical, and each indicator of concept understanding, can be concluded that Flipped Classroom integrated with Nested model is effective to improve student's concept understanding on heat and transfer material. This result is relevant to Janatin (2019) which obtain the result of student's improvement to understand mathematical concepts after learning with the Flipped Classroom model. Then, the same results were also obtained from Omes & Suyono (2020) which stated that learning designed with the Nested type of integration can affect student's critical thinking skills and concept understanding. In addition to focusing on each student's learning experience, the lack of interaction from students is a negative affect in online learning, so learning through Flipped Classroom integrated with Nested also has a positive effect on teacher and student interactions. Teachers are always needed to get feedback from student's answer or opinions, or some questions until they get concept clarification and their satisfaction (Mishra et al., 2020).

2. Student's Motivation to Learn

The effectiveness of the flipped classroom integrated with nested model is also reviewed from the improvement of student's motivation to learn. Motivation in learning process is important because someone who does not have the motivation to learn will not desire to do learning activities. One of the success factors of students in learning is influenced by the motivation of students to learn (Awe & Benge, 2017). The results of the student's motivation to learn were obtained through pretest and posttest activities using motivation questionnaires that have been developed before. The following is presented the result of student's motivation to learn.

Table 5. The result of student's motivation to learn

Mean			Category
Pretest	Posttest	N-Gain	
53	80	0.57	Medium

Based on the N-Gain analysis in table 5, the improvement in student's motivation to learn which is 0.57 in the medium category. It means that flipped classroom integrated with nested model is effective in improving student's motivation to learn. This is in line with research from Bawaneh and Moumene (2020) which stated that flipped classroom has a positive effect on motivation to learn, which is shown through the gestures of students that show great motivation and satisfaction. The same result was also obtained from Dewi (2020) that the student's motivation to learn during learning with the flipped classroom learning

https://doi.org/10.46627/silet.v3i1.105

model assisted by audio-visuals has improved as seen from the percentage of classical completeness from student attention, student activity, and student involvement in learning. The audio-visual media used in this research are PowerPoint and virtual lab applications.

The result of student's motivation to learn improvement was analyzed for each indicator in the motivation questionnaire with the ARCS model, namely attention, relevance, confidence, and satisfaction. The result of the questionnaire analysis of student's motivation to learn on each ARCS indicator using flipped classroom integrated with nested model is presented in table 6 as follows:

Table 6. Data of ARCS motivation improvement indicators

Motivation Indicators	Pretest	Posttest	*N-Gain*	Category
Attention	56	83	0.61	Medium
Relevance	55	82	0.60	Medium
Confidence	55	88	0.73	High
Satisfaction	59	83	0.59	Medium
Mean			**0.63**	**Medium**

Assessment of motivation to learn in this research is based on the ARCS approach (Attention, Relevance, Confidence, and Satisfaction) according to John Keller. The improvement of motivation to learn in this research is suitable with several factors carried out by the teacher and the students themselves. During the lesson, the teacher uses the V-Lab Kalor application and simple experimental videos as learning media. Arsyad (2016) states that learning media can improve and make students interested so that it can affect motivation and allow students to learn independently according to their abilities and interests. The use of the V-Lab Kalor and simple experimental videos in online learning during a pandemic makes students interested in the material to be taught so that it can foster student's motivation to understand the material. In addition, interactions involving teacher with students and student with other students through discussion also motivate students to learn in class. That treatment supports the result of the increase of motivation to learn on the *Attention* indicator which obtained a gain score of 0,61 in the medium category.

Sardiman (2014) also said that to create motivation in learning, students should be involved to think and act directly, or in other terms learning by doing. In learning, activity is needed, because without activity, the learning process may not take place properly. Learning with nested integration not only focuses on memorizing concepts, but also involves student activities based on several nested skills, such as making hypotheses, organizing data in tabular form, and making conclusion. These activities are obtained through virtual experiment activity or viewing experiment video, which can increase student's motivation to learn. This learning process in this research is also in line with Mishra et al. (2020) that stated during online learning, teachers use their freedom as an individual course instructors with giving instructions, setting questions, and final award of marks, so students do not only hear a lot of explanations from the teacher which make them bored.

V-Lab Kalor application in this research is used to do virtual experiments, and experimental video in this research is used for observational activities so that students can relate the experiments/observations with the concepts that have been studied and will be obtained at the end of the lesson. This also supports the result of the increasing of *Relevance* indicator which obtained a gain score of 0,60 in the medium category. Keller (1988) stated that students will consider learning is relevant if the learning is in accordance with their interests. If the learning is in accordance with their interest, then they will know what should they do to make learning useful for them.

The results of the increasing *Confidence* indicator which obtained a gain score of 0,73 in the high category and *Satisfaction* indicator which obtained a gain score of 0,59 in the

https://doi.org/10.46627/silet.v3i1.105

medium category are supported by the positive activities and positive responses of students based on learning with flipped classroom integrated with nested model. The level of self-confidence of students can be seen if students are able to learn the material, so the students will actively participate in learning including asking questions and expressing opinions.

Figure 4 below shows the improvement between student's pretest and posttest scores based on motivation to learn score.

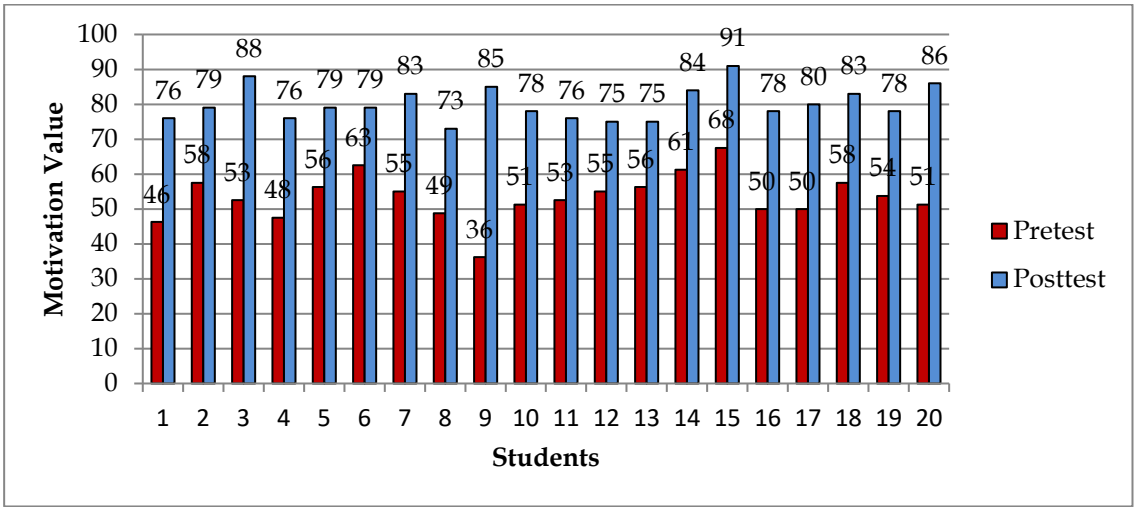

Figure 4. Graph of the improvement of student's motivation to learn

Furthermore, after obtaining data on the result of student's concept understanding and motivation to learn, a Product Moment correlation test was conducted to determine the relationship between the two variables. In the following, the result of the correlation test for student's concept understanding with motivation to learn is presented.

Table 7. Data analysis of the correlation of concept understanding with motivation to learn

Correlation	Correlation Coefficient (r_{hitung})	r_{table}	Description
r_{xy}	0.641	0.468	Significant

Based on table 7, the correlation coefficient r_{xy} between the variable concept understanding and motivation to learn of students is 0.641, where the result is greater than the value of r_{table} so that it is significant. Thus, it can be concluded that there is a relationship between concept understanding and motivation to learn of students. It means that when motivation to learn is improve, the concept understanding of students is also getting better. Sardiman (2014) stated that good motivation in learning will show good results. In other words, with a good effort and good motivation, someone who learns will reach a good achievement. The intensity of student's motivation is greatly determine the level of achievement in learning. This is relevant to the opinion of Riswanto & Aryani (2017) that stated students who have good motivation to learn usually have high learning outcomes.

CONCLUSION

This research shows that learning based on flipped classroom integrated with nested on heat and transfer material is effective in improving student's concept understanding and motivation to learn. Student's concept understanding of heat and transfer material has improved after participating in flipped classroom integrated with nested learning with an average gain score (N-gain) is 0.65 which is classified in the medium category and has a completeness value of 90%. Student's motivation to learn after participating in flipped classroom integrated with nested learning also improved with an average gain score (N-gain) is 0.57 which was classified in the medium category. This research implies that learning through flipped classroom

integrated with nested model can improve student's concept understanding and motivation to learn. For further research is hoped that teachers should give time at the beginning (such as briefing) to give an understanding of how to learn through flipped classroom integrated with nested model and guide more intensely at each step of learning for students who have never learned through flipped classroom integrated with nested model. In addition, future research is also expected to focus on training or improving more nested skills written by Fogarty to students using flipped classroom integrated with nested model.

ACKNOWLEDGEMENTS
Thanks to the lecturers, science teacher as tutor, and all those who helped in this research.

REFERENCES

Anderson, L. W., & Krathwohl. D. R. (Eds.). (2010). *Kerangka landasan untuk pembelajaran, pengajaran, dan asesmen revisi taksonomi pendidikan Bloom* (A. Prihantoro, Trans.). Pustaka Pelajar. (Original work published 2001).

Arsyad, A. (2016). *Media pembelajaran*. Rajawali Pers.

Awe, E. Y., & Benge, K. (2017). Hubungan antara minat dan motivasi belajar dengan hasil belajar IPA pada siswa SD. *Journal of Education Technology*, *1*(4), 231-238. https://doi.org/10.23887/jet.v1i4.12859

Bawaneh, A. K., & Moumene, A. B. H. (2020). Flipping the classroom for optimizing undergraduate students' motivation and understanding of medical physics concepts. *Eurasia Journal of Mathematics, Science and Technology Education*, *16*(11), 2–16. https://doi.org/10.29333/ejmste/8561

Boucher, B., Robertson, E., Wainner, R., & Sanders, B. (2013). "Flipping" Texas State University's physical therapist musculoskeletal curriculum: Implementation of a hybrid learning model. *Journal of Physical Therapy Education*, 27(3), 72-77.

Cahyani, A., Listiana, I. D., & Larasati, S. P. D. (2020). Motivasi belajar siswa SMA pada pembelajaran daring di masa pandemi Covid-19. *IQ (Ilmu Al-Qur'an): Jurnal Pendidikan Islam*, *3*(01), 123–140. https://doi.org/10.37542/iq.v3i01.57

Chan, Y. L., & Norlizah, C. H. (2018). Students' motivation towards science learning and students' science achievement. *International Journal of Academic Research in Progressive Education and Development*, *6*(4), 174–189. https://doi.org/10.6007/ijarped/v6-i4/3716

Dastidar, S. G. (2021). The impact of students' perceptions of online learning environments on students' satisfaction in the context of Covid-19 pandemic. *Studies in Learning and Teaching*, *2*(3), 61–72. https://doi.org/10.46627/silet.v2i3.84

Dewi, N. L. P. S. (2020). Peningkatan motivasi dan prestasi belajar siswa pada materi virus dengan pembelajaran flipped classroom berbantukan media audio visual. *Jurnal Pendidikan Edutama*, *7*(2), 47-60. https://doi.org/10.30734/jpe.v7i2.922

Garza, S. A. (2014). The flipped classroom teaching model and its use for information literacy instruction. *Communications in Information Literacy*, *8*(1), 7–22. https://doi.org/10.15760/comminfolit.2014.8.1.161

Hake. (1999). *Analyzing change/gain scores*. https://web.physics.indiana.edu/sdi/AnalyzingChange-Gain.pdf

Herala, A., Vanhala, E., Knutas, A., & Ikonen, J. (2015). Teaching programming with flipped classroom method: A study from two programming courses. *ACM International Conference Proceeding Series*, 165–166. ttps://doi.org/10.1145/2828959.2828983

Janatin, Y. (2019). *Penerapan model flipped classroom untuk meningkatkan kemampuan pemahaman konsep matematis siswa SMP*. [Unpublished Undergraduate Thesis]. Universitas Islam Negeri Raden Intan Lampung.

Keller, J. (1988). Motivational design instruction. In C. M. Reigeluth (Ed.), *Instructional design theories and models*. Hillsdale, NJ: Lawrence Erlbaum Associates.

Kohli, H., Wampole, D., & Kohli, A. (2021). Impact of online education on student learning during the pandemic. *Studies in Learning and Teaching*, *2*(2), 1–11. https://doi.org/10.46627/silet.v2i2.65

Limaymanta, C. H., Tapia, L. A., Vidal, E., & Chaviano, O. G. (2021). Flipped classroom in higher education: A bibliometric analysis and proposal of a framework for its implementation. *International Journal of Emerging Technologies in Learning*, *16*(9), 133–149. https://doi.org/10.3991/ijet.v16i09.21267

Mishra, L., Gupta, T., & Shree, A. (2020). Online teaching-learning in higher education during lockdown period of COVID-19 pandemic. *International Journal of Educational Research Open*, *1*(June), Article 100012. https://doi.org/10.1016/j.ijedro.2020.100012

Mutoharo, S. Z. R., Sudibyo, E., & Mitarlis. (2015). Hubungan motivasi belajar terhadap pemahaman konsep IPA pada siswa kelas VIII SMP Negeri 21 Surabaya. *Jurnal Pendidikan Sains*, 3(2).

Nawastheen, F. M., & Perera, S. A. S. K. (2021). Students' perceptions on participating in remote learning activities in the time of Covid-19 Pandemic. *Studies in Learning and Teaching*, *2*(3), 33–44. https://doi.org/10.46627/silet.v2i3.81

Nouri, J. (2016). The flipped classroom: For active, effective and increased learning – especially for low achievers. *International Journal of Educational Technology in Higher Education*, *13*(1), 1-10. https://doi.org/10.1186/s41239-016-0032-z

Omes, M. F. M. S., & Suyono (2020). Learning of reaction rate with nested curricular arrangement to improve critical thinking skills and understanding the concept of students in active-reflective learning. *JCER (Journal of Chemistry Education Research)*, *3*(2), 46-50. https://doi.org/10.26740/jcer.v3n2.p46-50

Permendikbud RI. (2014). Pe*raturan menteri pendidikan dan kebudayaan Republik Indonesia nomor 58 tahun 2014 tentang kurikulum 2013 Sekolah Menengah Pertama/Madrasah Tsanawiyah*. Kemdikbud RI. https://jdih.kemdikbud.go.id/arsip/Permendikbud%20Nomor%2058%20Tahun%202014-digabungkan.pdf

Riduwan. (2013). *Dasar-dasar statistika*. Alfabeta.

Riswanto, A., & Aryani, S. (2017). Learning motivation and student achievement: Description analysis and relationships both. *COUNS-EDU: The International Journal of Counseling and Education*, *2*(1), 42-47. https://doi.org/10.23916/002017026010

Sardiman, A. M. (2014). *Interaksi dan motivasi belajar mengajar*. Rajawali Pers.

Sugiyono. (2017). M*etode penelitian pendidikan pendekatan kuantitatif, kualitatif, dan R&D*. Alfabeta.

Tangkearung, S. S., & Lolotandung, R. (2020). Penerapan model pembelajaran terpadu tipe nested untuk meningkatkan hasil belajar siswa kelas III Sekolah Dasar. *Jurnal KIP*, 9(3), 51–55.

Yadav, A., Sankhla, M., & Yadav, K. (2021). Teachers' perception about flipped classroom in era of COVID-19 pandemic. *Studies in Learning and Teaching*, *2*(2), 26–34. https://doi.org/10.46627/silet.v2i2.69

https://doi.org/10.46627/silet.v3i1.105

Author (s):

*Aisyah Jiyantika Gitadewi (Corresponding Author)
Magister of Science Education Program, Postgraduate Program,
Universitas Negeri Surabaya,
Jl. Lidah Wetan, Surabaya 60213, Indonesia
Email: aisyahjiyantika@gmail.com

Prabowo
Department of Physics, Faculty of Mathematics and Natural Science,
Universitas Negeri Surabaya,
Jl. Ketintang, Surabaya 60231, Indonesia
Email: prabowo@unesa.ac.id

Zainul Arifin Imam Supardi
Department of Physics, Faculty of Mathematics and Natural Science,
Universitas Negeri Surabaya,
Jl. Ketintang, Surabaya 60231, Indonesia
Email: zainularifin@unesa.ac.id

Wiwien Maryuni
Junior High School 21 Surabaya
Jl. Jambangan IV, Surabaya 60232, Indonesia
Email: wiwienmaryuni@gmail.com