The Effectiveness of Using The Flipped Classroom Learning Model on Students' Concept Understanding in Video Material in Class X SMK Negeri 7 Surabaya

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Abstract. This research was conducted to find out how the influence was obtained in the application of the Flipped Classroom learning model to class X TAV students at SMK Negeri 7 Surabaya. Based on the results of observations through the interview method at SMK Negeri 7 Surabaya, it can be seen that the subject teachers, especially the Audio Video Engineering subject teachers, have not gotten used to or used the learning model effectively due to limited time, cost, and manpower so that the impact on learning activities is less than optimal. teach. Flipped Classroom as a learning model is thought to be able to increase students' understanding of receiving learning. Understanding is a process of thinking and learning. It is said so because to lead to understanding needs to be followed by learning and thinking. With knowledge alone students do not necessarily understand something that is meant in depth, they just know without being able to grasp understanding. Students who have an understanding of the lesson not only listen to something that is learned but are also able to describe and understand the concept of the lesson. This study uses a quantitative approach, namely an approach that emphasizes its analysis of numerical data (numbers) processed by statistical methods. As explained earlier, this research is a quasi-experimental research where like this research two groups will be determined, namely the control group and the experimental group. The control group is the group that was not given treatment, while the experimental group is the group that was given treatment. Data analysis techniques in this study used homogeneity tests, normality tests, paired sample t-tests, and independent sample t-tests. From the data analysis that has been carried out, there is a difference in the average produced by the experimental class using the Flipped Classroom learning model and the control class using the lecture method. The control class only gets a post-test average with a score of 67.17. The experimental class with the Flipped Classroom model gets a value of 86.33.

Keywords: Flipped Classroom; Learning; Video Material

1   Introduction

One type of learning approach is the flipped classroom model. by minimizes the number of direct instructions but maximizes one-to-one interaction [1], [2]. With the Flipped Classroom model students can learn from video tutorials given by the teacher, so that in learning students don't get bored easily because they only listen to explanations from a teacher. Students' comprehension of re-receiving material can be enhanced by the flipped classroom learning paradigm [3], [4]. Thinking and learning are processes that lead to understanding. It is expressed this way because thinking and learning must come before comprehension. With knowledge alone students do not necessarily understand something that is meant in depth, they just know without being able to grasp understanding. Students who have an understanding of the lesson not only listen to something that is learned but are also able to describe and understand the concept of the lesson.

Based on an interview with one of the teachers at SMK Negeri 7 Surabaya, students at SMK Negeri 7 Surabaya tend to be passive in participating in the learning process. This can be seen in the individual and group task spelling completeness data. Students at SMK Negeri 7 Surabaya tend to not be active and the percentage of work done is still low. Judging from observations during the implementation of the Field Experience Practice (PPL) program at SMK Negeri 7 Surabaya, it can be seen that subject teachers, especially Audio Video Engineering subject teachers, have not gotten used to or used the learning model effectively due to limited time, cost, and manpower so that it has an impact on at less than the maximum teaching and learning activities. That is, the learning outcomes are not only seen from the achievement of scores that have not been completed but can also be seen from the lack of students' understanding of the material provided by the teacher.

The flipped classroom is an innovative approach to learning that reverses the traditions of the school classroom [5], [6]. In this model, learning materials that are usually delivered in class by teachers, such as lectures or presentations, are transferred to students' homes through various sources, including learning videos or reading materials. Students are expected to understand this material at home, which provides time flexibility in the learning process. When in class, time that is usually used to present material is used for activities that are more interactive and focus on deeper understanding. Students discuss, collaborate in groups, solve problems, and receive direct guidance from teachers as they apply the concepts they have learned at home [7], [8].

The advantages of the flipped classroom include more effective use of time in class [9], [10], encouraging student independence in learning [11], [12], and allowing for more involved and individualized learning [13], [14]. This model also allows teachers to be more flexible in providing assistance and attention to students who need it. However, the success of this approach depends on careful planning by teachers, the development of appropriate learning materials, and adequate access to technology by students. The flipped classroom is not a suitable solution for every learning situation, but it can be a useful alternative in changing the way we view the traditional learning process.

Students in SMK (Vocational High School) have unique characteristics related to the vocational education they receive [15], [16]. Vocational school students are individuals who have chosen a special educational path that focuses more on practical skills and theoretical understanding in a particular field [17], [18]. They come to SMK to prepare themselves more specifically for a particular career or job. Because of this, they often have a high level of interest and motivation in the subject they are studying [19], [20]. Students at SMK are usually more involved in practical learning. This means that they have the opportunity to develop strong practical skills and have real-world experience that they can apply after graduation.

Vocational school students also learn theory relevant to their field [21], [22], although the learning approach is usually more integrated with practical applications. This allows them to have a deep understanding of the concepts underlying their skills, which can help them become more competent and adaptive professionals in the world of work. In the course of their vocational school education, students also often have the opportunity to take part in internships or training in the real world of work [23], [24], which can be valuable capital in preparing their careers after graduation.

From the background described above, several problems arise in this study, 1) How is the effectiveness of the flipped classroom learning model on understanding concepts in class X SMK Negeri 7 Surabaya in video material? 2) What is the comparison of the effectiveness of learning using conventional learning models (lectures) and flipped classrooms on understanding concepts in video material in class X SMK Negeri 7 Surabaya? Based on the formulation of the problem above, the objectives to be achieved through this research are: 1) To find out the effectiveness of the flipped classroom learning model on understanding the concept of video subjects for class X students of SMK Negeri 7 Surabaya. 2) To compare the effectiveness of learning using conventional learning models (Lectures) and the flipped classroom learning model on understanding the concept of video material in class X SMK Negeri 7 Surabaya.

2   Method

This study takes a quantitative approach, meaning that it places a strong emphasis on analyzing numerical data—that is, numbers—that have been subjected to statistical processing. As explained in the background above, this research is a quasi-experimental study. In this study, two groups were determined, specifically, the experimental group and the control group. The experimental group received treatment, whereas the control group did not receive any treatment at all. The two groups were randomly selected and then given a pretest to find out the initial state is there a difference between the experimental group and the control group. The effect of the treatment is $(O2 - O1) - (O4 - O3)$.

Table 1. Research Design

Subject	Group experiment	O1 (Pretest)	X Treatm ent	O2 Postest

Researchers	Group Control	O2 (Pretest)	C No treatment	O4 Postest

3   Results and Discussion

3.1   Homogeneity Test

  Homogeneity is taking into account the two sources of error that appear in the planned test. The two sources of error are, namely, 1) the content or content of the test is split. 2) The heterogeneity of the behavior of the domain being sampled. From the results of data analysis that was carried out using SPSS version 21, it is known that the value of homogeneity in the control class and experimental class obtained based on mean values with sig 0.242, values based on median sig 0.242, values based on median and with adjusted df sig 0.243, and based on trimmed mean value with sig 0.226. From this value, it can be seen that the significant results are greater than 0.05. With this, it is stated that the data is either homogeneous.

3.2   Normality Test

The purpose of the normalcy test is to compare our data with normally distributed data that shares our data's mean and standard deviation. To assist in this normality test the researcher used the SPSS version 21 program to make calculations more accurate. The results of the normality test obtained the significance value of the control class at 0.121 and the significance value of the experimental class at 0.164. With these values, the data can be declared normally distributed because it has a significance value of more than 0.05.

3.3   Test the N-gain

Due to the large number of observations that must be made, it will be challenging to gauge the learning model's effectiveness during the process. Measuring the increase in the degree to which targets are met from the beginning before treatment (initial ability test) to the target learning outcomes after therapy is administered (post test) is probably the most likely method to accomplish this. The following are the post-test results from the experimental class:

Table 2. Experiment Class N-gain Test Results

	N	Mini mum	Maxi mum	Mean	Std. Deviati on
N gain_Score	30	.55	1.00	.8071	.14295
N-gain_percent	30	54.55	100.00	80.7131	14.29526
Valid N (listwise)	30				

Table 3. Control Class N-gain Test Results

	N	Minimum	Maximum	Mean	Std. Deviation
N-gain_score	30	-.43	.50	.0704	.20036
N-gain_Percentage	30	-42.86	50.00	7.0370	20.03614
Valid N (listwis e)	30				

As may be observed, the control class's n-gain score only received a value of 7%. In the meantime, the experimental class received an 80%. This demonstrates that the experimental class is classified as having a high effectiveness based on the n-gain interpretation table. In the meantime, the control group is classified as having minimal effectiveness. Thus it can be concluded in the first hypothesis that Ho, namely the effectiveness of the Flipped Classroom learning model, is rejected, while Ha, namely the effectiveness of the high Flipped Classroom learning model, is accepted.

3.4   Test the paired sample t-test

This test was carried out to find out if there was an average difference between the two samples tested in the experimental class and the control class. The results of the test calculations can be seen in the following table:

Table 4. Uji Paired Samples Test

		Paired Differences	T	df	Sig. (2-tailed)
		Mean			
Pair 1	Pre Eksperimen -Post Eksperimen	-32.167	-15.031	29	.000
Pair 2	Pre kontrol- Post Kontrol	-24.333	-14.691	29	.000

4   Conclusion

 Based on the results of the development that has been carried out by researchers, it can be concluded that: (1) Based on research conducted using the Flipped Classroom learning model in the experimental class, namely class X TAV at SMK Negeri 7 Surabaya, it shows a high level of effectiveness. This can be seen in the results of the n-gain test which shows a high classification of effectiveness. Based on the N test - Gain, the experimental class that uses the flipped classroom learning model gets a percentage score of 80.71%. Based on the N-gain effectiveness classification table, the effectiveness of learning using the flipped classroom learning model has high effectiveness. (2) Research conducted using the flipped classroom learning model in the experimental class and conventional learning models (lectures), shows that there are differences in effectiveness in the control class and the experimental class. Based on the N-gain test, the experimental class gets a percentage score of 80.71 %. Based on the N-gain effectiveness classification table, the effectiveness of learning using the flipped classroom learning model has high effectiveness. As for the control class, the

N-gain percentage score only scores at 7.03%. It can be concluded that there is a difference in effectiveness between the flipped classroom learning model and conventional learning models, where the flipped classroom learning model has higher effectiveness compared to conventional learning models (Lectures). The suggestions that are expected from the results of this study can be suggested by researchers are: (1) The use of flip classroom model can be used to make students more active in conducting discussions in learning because they have studied the subject matter in advance so that students can more easily understand the concept of the material provided by the teacher. (2) In applying the flipped classroom learning model, it can be done by selecting teaching materials that are appropriate to the subject matter topics to be provided such as videos, subject matter infographics, and so on. This will make students able to understand the concepts of the material provided appropriately and effectively.

References

1. Y. E. Prefume, "Exploring a flipped classroom approach in a Japanese language classroom: A mixed methods study.," Dissertation Abstracts International Section A: Humanities and Social Sciences, vol. 77, no. 7-A(E), 2017.

2. H. S. S. J. Singh, C. K. S. Singh, T. M. T. Mohtar, and N. A. Mostafa, "A Review of Research on Flipped Classroom Approach for Teaching Communication Skills in English," International Journal of Academic Research in Business and Social Sciences, vol. 7, no. 10, 2017, doi: 10.6007/ijarbss/v7-i10/3362.

3. Z. Li and J. Li, "Using the Flipped Classroom to Promote Learner Engagement for the Sustainable Development of Language Skills: A Mixed-Methods Study," Sustainability (Switzerland), vol. 14, no. 10, 2022, doi: 10.3390/su14105983.

4. M. Heni and S. Ridlo, "The Effectiveness of Flipped Classroom to Improve Students' Concept Understanding and Self Efficacy during the Covid-19 Pandemic," Journal of Biology Education, vol. 10, no. 1, 2021.

5. C. H. Limaymanta, L. Apaza-Tapia, E. Vidal, and O. Gregorio-Chaviano, "Flipped Classroom in Higher Education: A Bibliometric Analysis and Proposal of a Framework for its Implementation," International Journal of Emerging Technologies in Learning, vol. 16, no. 9, 2021, doi: 10.3991/ijet.v16i09.21267.

6. B. Akuffo, S. Okae -Adjei, and S. Dzisi, "Flipped Learning as an Alternative for Effective and Efficient Learning Pathway in Technical and Vocational Education and Training (TVET): Evidence from Koforidua Technical University – Ghana," Koforidua Technical University–Ghana, 2019.

7. L. D. S. Adnyani and N. N. A. Ratnadi, "The implementation of flipped classroom on classroom management course," in Journal of Physics: Conference Series, 2020. doi: 10.1088/1742-6596/1516/1/012035.

8. R. Somma, "Advances in Flipped Classrooms for Teaching and Learning Forensic Geology," Educ Sci (Basel), vol. 12, no. 6, 2022, doi: 10.3390/educsci12060403.

9. S. Baillie, A. Decloedt, and M. F. Londgren, "Designing Flipped Classrooms to Enhance Learning in the Clinical Skills Laboratory," J Vet Med Educ, vol. 49, no. 6, 2022, doi: 10.3138/jvme-2021-0043.

10. R. A. Howell, "Engaging students in education for sustainable development: The benefits of active learning, reflective practices and flipped classroom pedagogies," J Clean Prod, vol. 325, 2021, doi: 10.1016/j.jclepro.2021.129318.

11. A. Ainulluluah, E. Boeriswati, Y. Rahmawati, and B. Setiawan, "Systematic Literature Review: Improving Self Regulated Learning Through The Flipped Classroom Model Based on Interactive E-Books," Jurnal Basicedu, vol. 6, no. 3, 2022, doi: 10.31004/basicedu.v6i3.2853.

12. H. Qutob, "Effect of flipped classroom approach in the teaching of a hematology course," PLoS One, vol. 17, no. 4 April, 2022, doi: 10.1371/journal.pone.0267096.

13. H. Yildiz Durak, "Flipped classroom model applications in computing courses: Peer-assisted groups, collaborative group and individual learning," Computer Applications in Engineering Education, vol. 30, no. 3, 2022, doi: 10.1002/cae.22487.

14. M. Förster, A. Maur, C. Weiser, and K. Winkel, "Pre-class video watching fosters achievement and knowledge retention in a flipped classroom," Comput Educ, vol. 179, 2022, doi: 10.1016/j.compedu.2021.104399.

15. J. Cao, "Exploration on the Construction of Mixed 'Golden Courses' in Higher Vocational Education——Take 'Comprehensive German' as an example," Scholars Journal of Arts, Humanities and Social Sciences, vol. 10, no. 3, 2022, doi: 10.36347/sjahss.2022.v10i03.002.

16. X. Zeng, "Research on Problems and Countermeasures of Students' Mental Health Education in Higher Vocational Colleges," 2019. doi: 10.2991/icsshe-19.2019.27.

17. U. S. Goth and E. M. Schön, "Teaching Entrepreneurship by Using the "Student Enterprise Model" to Future Vocational Teachers," Journal of Education and Vocational Research, vol. 6, no. 1, 2015, doi: 10.22610/jevr.v6i1.181.

18. R. Liivik, S. Rekkor, and M. Sirk, "Integration of the theory of vocational didactics with school practice: observations of vocational teacher students.," Estonian Journal of Education / Eesti Haridusteaduste Ajakiri, vol. 7, no. 2, 2019.

19. N. N. Maslennikova, I. I. Gibadulina, and E. A. Gafiyatullina, "DEVELOPMENT of SPECIAL CHEMISTRY SKILLS in the UNIVERSITY VOCATIONAL TRAINING SYSTEM of the STUDENTS," Periodico Tche Quimica, vol. 17, no. 36, 2020, doi: 10.52571/ptq.v17.n36.2020.1142_periodico36_pgs_1127_1147.pdf.

20. A. Stellmacher, S. Ohlemann, J. Pfetsch, and A. Ittel, "Pre-service teacher career choice motivation: A comparison of vocational education and training teachers and comprehensive school teachers in Germany," International Journal for Research in Vocational Education and Training, vol. 7, no. 2, 2020, doi: 10.13152/IJRVET.7.2.5.

21. Suharno, N. A. Pambudi, and B. Harjanto, "Vocational education in Indonesia: History, development, opportunities, and challenges," Children and Youth Services Review, vol. 115. 2020. doi: 10.1016/j.childyouth.2020.105092.

22. S. B. Asplund, N. Kilbrink, and H. Asghari, "Visualising the intended practical doing: Future-oriented movements in swedish vocational school workshop settings," International Journal for Research in Vocational Education and Training, vol. 8, no. 2, 2021, doi: 10.13152/IJRVET.8.2.2.

23. Y. Chen and N. Gan, "Sustainable development of employability of university students based on participation in the internship promotion programme of Zhejiang Province," Sustainability (Switzerland), vol. 13, no. 23, 2021, doi: 10.3390/su132313454.

24. C. Swartz and E. E. Valeeva, "Module to scaffold the process of filling grant documents in English," Vestnik of Samara State Technical University Psychological and Pedagogical Sciences, vol. 17, no. 2, 2020, doi: 10.17673/vsgtu-pps.2020.2.14.