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Effectiveness of Flipped Classroom Model Learning Using Microlearning on Buffer Solution Material

Hana Alya Puteri[1], Maria Paristiowati[2], Zulhipri[3], Nur Azizah Putri Hasibuan[4*], Prita Atria Karyadi[5]

[1,2,3,5] Chemistry Education Department, Faculty of Mathematics and Natural Sciences, Universitas Negeri Jakarta, Jl. Pemuda No. 10, Rawamangun 13220, Jakarta, Indonesia
[4] Chemistry Education Study Program, Faculty of Tarbiyah and Teacher Training, UIN Sheikh Ali Hasan Ahmad Addary Padangsidimpuan, Jl. H. T. Rizal Nurdin, KM 0.5, Padangsidimpuan, 22177, North Sumatra, Indonesia.

*Correspondence: nurazizahhsb@uinsyahada.ac.id

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Abstract
This study aims to determine the effectiveness of learning the flipped classroom model with microlearning on class XI buffer solution material. This research was conducted at SMA Negeri 99 Jakarta using a qualitative method. The sample used in this study was 35 students of class XI. This study refers to indicators of learning effectiveness, namely the management of learning implementation, communicative teaching-learning processes, student responses, learning activities, and learning outcomes. The instruments used in this study were observation, questionnaires, test questions, reflective journals, and interviews. The results of this study are that the flipped classroom learning model with microlearning is effective for use in buffer solution materials.

1. Introduction

The use of internet and smartphone technology in today's digital era can have both positive and negative impacts. With this positive impact comes many innovations from various fields. Meanwhile,

one of the negative impacts of using this technology is technology addiction, so this impact can provide new challenges in human life. One of the fields that innovate the use of Internet and smartphone technology is the field of education. In the field of education, many positive impacts can be reaped from the use of this technology, namely the use of e-learning, e-library, e-book, e-laboratory, and others.

One of the learning models that supports the development of technology at this time is the flipped classroom model. Where flipped classroom is a learning model used by teachers by instructing students to study material at home first before class starts and in-class activities in the form of assignments or discussions related to material that has not been understood. If there are difficulties, they can be asked to friends or the teacher so that they can be resolved (Mandasari & Wahyudin, 2021). The development of technology today, causes changes in the way students learn today. Thus, students can search for learning materials or information related to learning materials through a smartphone or computer connected to the internet independently. However, this online learning can eliminate the focus of students on the learning process.

One of the educator's strategies so that students can easily understand learning materials and are interested in learning so that they can achieve these learning goals is using microlearning. Microlearning consists of two words (Micro: small size) and (Learning: learning activities), namely learning activities on a small scale. Microlearning is used as a strategy for designing learning content into small and focused segments. It involves creating small chapters or topics that are used in e-learning. There are many modes and formats of microlearning content delivery, such as (1) image-based microlearning content, including infographics, process diagrams, memes, and animated GIFs; (2) audio-based microlearning content, including short narratives and podcasts; and (3) video-based microlearning content, including flashcards videos, screencasts, microlearning vlogs, demonstration videos, and time-lapse videos (Sankaranarayanan et al., 2022).

Research on learning with the flipped classroom model has been conducted. In the research of Saputra, M. E. A., & Mujib. (2018) on the effectiveness of the flipped classroom model using mathematics learning videos on concept understanding, there are differences in the ability to understand the mathematical concepts of students with the application of the flipped classroom model using learning videos. Furthermore, the ability to understand the mathematical concepts of students with the Flipped classroom model using learning videos is better than the lecture learning method. In Damayanti's research, H. N., & Sutama. (2016) stated that using the Flipped classroom model is

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effective for testing students' creative attitudes, responsibility, and learning skills. Ardiana et al. (2020) showed that the application of the Flipped Classroom learning model was more effective than the application of the direct learning model.

Meanwhile, research on learning by using microlearning has also been conducted by Zarshenas, et al., (2022) with the title 'The effect of micro-learning on learning and self-efficacy of nursing students: an interventional study' that the results showed Micro-learning is an effective training method to improve learning outcomes and self-efficacy among nursing students, especially in internship units. This method is recommended because multimedia pays attention to all learning styles of learners and affects the learning outcomes and self-efficacy of learners. In the research of Adhipertama, M. C. (2020) with the title 'Development of Learning Video Based on Micro-Learning Principle Towards Science Subject in Junior High School' the results of this study revealed that learning videos based on microlearning principles are very good qualifications and are feasible to implement as a support for learning activities to create more interesting and fun activities. The results of research by Elpina, N., & Haris, D. (2023) entitled 'Development of Microlearning-Based Mobile Learning Modules in Flipbook on the Material of Two-Variable Linear Equation Systems in grade X at SMAN 1 Sorkam' from this study resulted in learning by using valid and practical microlearning-based mobile modules is classified as effective to use.

Learning using microlearning can support flipped classroom learning because it has the same advantages, which can increase the effectiveness and efficiency of the learning process. This learning is also digital, where learning can be done anywhere and anytime so that students can also learn independently. The media that can be used in flipped classroom model learning with microlearning are learning videos, infographics, articles, or podcasts that are designed into small segments so that students can digest, understand, and remember more easily.

These media are used as teaching materials for students to learn the subject matter at home, then when in class students can do assignments, discussions, and confirmation of concepts that students have not understood as reinforcement or deepening of students related to the material. Based on the things described above, researchers are interested in researching "The Effectiveness of Flipped Classroom Model Learning Using Microlearning on Buffer Solution Material".

This research is expected to provide benefits including, learning using the flipped classroom model with microlearning can be used as alternative learning in chemistry learning, increasing teacher

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knowledge to carry out creative learning and selection of the latest learning media, increasing student learning motivation, increasing student interest in learning chemistry, and making it easier for students to understand chemistry learning material.

2. Materials and Methods

The research method used in this study is qualitative. This research begins with the preparation of research instruments, then validation of research instruments by expert lecturers, and after that the implementation of research and data processing of research results. This research was conducted at SMA Negeri 99 Jakarta in the even semester of the 2022/2023 academic year. The subjects of this study were 35 students of grade 11^{th} MIPA at SMA Negeri 99 Jakarta, consisting of 15 male students and 20 female students.

Data data was obtained from this study in several ways, namely: (1) Observation sheet on learning activities, (2) reflective journal distribution, (3) questionnaire distribution, (4) test questions, and (5) interviews. The content of this learning effectiveness questionnaire refers to the indicators of learning effectiveness, namely the management of learning implementation, the learning process of communicative teachers, student responses, learning activities, and learning outcomes. The purpose of carrying out this test is to find out the learning outcomes of students so that it can be known that the use of the learning model is effective. The classification of learning outcomes can be seen in the following table (Yusuf, 2018).

Tabel 1 Grouping learning outcomes

Score Achievement (0-100)	Criteria
85 ≤ skor ≤ 100	Very good
75 ≤ skor < 85	Good
60 ≤ skor < 75	Fair
50 ≤ skor < 60	Deficient
0 ≤ skor < 50	Very less

The procedure that will be carried out in this research goes through three stages, namely the preparation stage, the implementation stage, and the final stage. Details can be seen in Figure 1.

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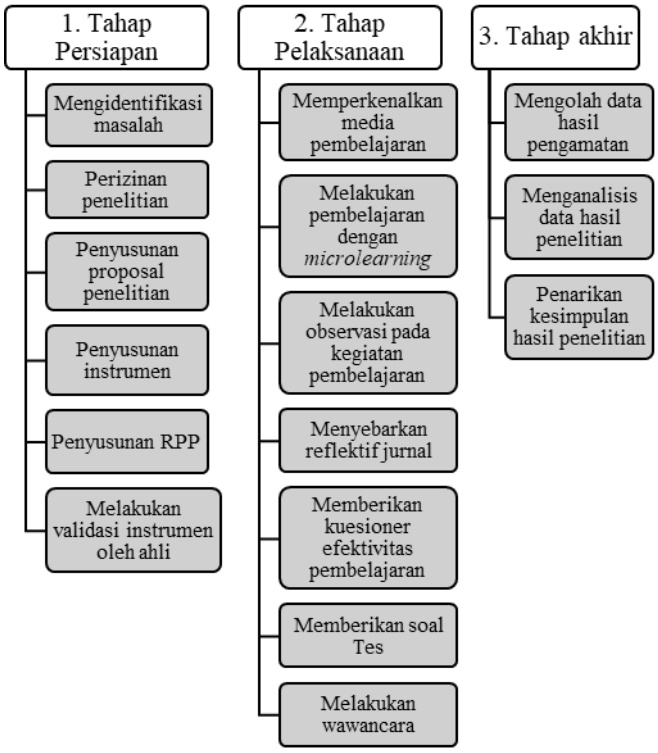
This research uses qualitative data analysis techniques developed by Miles and Huberman (in Abdussamad, 2021) that activities in qualitative data analysis are carried out interactively and



continue until completion so that the data is saturated. Activities in data analysis, namely: (1) Data reduction, (2) Data display, (3) Conclusion Drawing/Verification.

Figure 1. Schematic of the Research Procedure

3. Results and Discussions

Learning flipped classroom model with microlearning

The learning steps in the flipped classroom model with microlearning in this study are (1) before class or activities before learning in class, (2) during class or activities during learning in the classroom, and (3) after class or activities after class learning.

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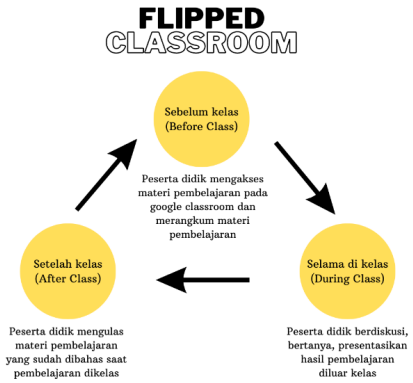

Figure 2. Implementation stages of learning with the Flipped Classroom model

Figure 3. Learning activities in the classroom

1) Before class

Activities before classroom learning are carried out, namely, the teacher provides learning material on Google Classroom. Furthermore, students study and understand learning materials at home or outside of class learning hours. Teachers provide learning materials in two forms of microlearning media, namely infographics and learning videos.

2) During class

Activities during learning in the classroom begin with the teacher taking attendance of students, then the teacher reviews a little learning material that has been given during in-class learning and provides opportunities for students to ask questions and discuss. Next, students make presentations from the summary of the material they have learned and understood, then other students pay attention. During the presentation, if there is an inaccurate explanation, the teacher can straighten out the inaccurate things, and then the teacher allows students to ask questions about things that have not been understood.

3) After class

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Activities after learning in class, the teacher reminds students to review the learning material outside the classroom.

Learning effectiveness of flipped classroom model using microlearning

In this study, the effectiveness of the flipped classroom model with microlearning is measured through five indicators, namely the management of learning implementation, the learning process of communicative teachers, student responses, learning activities, and learning outcomes. The following are the results of data analysis on the effectiveness of flipped classroom model learning using microlearning on buffer solution material in each indicator:

1) Pengelolaan pelaksanaan pembelajaran

Based on the results of the questionnaire, it is known that students state that this learning helps in understanding the learning material, this learning is easier in understanding the material than using the method used before, and this learning runs in a structured manner under the Learning Implementation Plan. So it can be concluded that the management of this learning implementation has been carried out well because the learning is under the Learning Implementation Plan and the learning process also runs smoothly.

Table 2. Questionnaire results of learning implementation management indicators

No	Questionnaire	Result
1.	This learning helps in understanding the learning material	77,85%
2.	This learning is easier to understand the material than using the method used before	69,28%
3.	This lesson is structured according to the lesson plan.	78,57%

This is following the statement that carrying out the learning process must continue to be guided by the lesson plan so that the learning process carried out becomes more directed, and structured and learning objectives can be achieved as well as possible (Anggraeni & Akbar, 2018). The use of microlearning media can help reduce students' cognitive load when learning learning learning materials because understanding the material becomes easier because the material is delivered in stages (Susilana, R., et al, 2022).

2) Indicators of communicative teaching and learning process

Based on the results of the questionnaire, learners stated that learners find it easy to communicate with teachers during learning, and the interaction between teachers and learners is more effective in flipped classroom learning with microlearning. Through interaction with teachers or friends in class,

DOI: 10.24952/lavoisier.v3i1.1111

learners can clarify and articulate their understanding and achieve meaningful learning, resulting in better learning outcomes (Cho, M. H, et al, 2019).

Table 3. Communitive Teaching and Learning Process Indicator Questionnaire results

No	Questionnaire	Result
1.	I feel that flipped classroom learning with microlearning makes it easier for me to communicate with the teacher.	71,42%
2.	Interaction between students and teachers is more effective in learning using flipped classroom with microlearning.	72,85%

Based on the description above, it can be concluded that learning with the flipped classroom model using microlearning can build interaction with the teacher easily and more effectively. This is to the statement (Ishak, Kurniawan, & Zainuddin, 2019) that learning with the flipped classroom method provides many opportunities for students to discuss and interact with teachers and helps them improve their quality through feedback given by the teacher directly both in groups and individually.

3) Learner response indicators

Based on the results of the questionnaire, class students stated that this learning can foster students' enthusiasm for learning, and this learning can help students in learning independently. This flipped classroom learning process requires learners to independently find out the information using existing technology and study it at home (Yanuarto, 2018). This learning makes learners feel comfortable learning using technology.

In the results of the class student questionnaire stated that this learning was very interesting and fun, learning the flipped classroom model with microlearning students can focus more on learning. This is because the content of short-duration microlearning reduces mental fatigue caused by longer-duration lessons (Shail, M., 2019), and flipped classroom model learning with microlearning learners makes it easier to remember the learning material. Learning using microlearning can make learning content easier to understand and can be remembered for a long time (Sinaga, et al, 2022).

Table 4. Results of the Learner Response Indicator Questionnaire

No	Questionnaire	Result
1.	Flipped classroom learning with microlearning fosters my passion for learning	73,57%
2.	Flipped classroom learning with microlearning helps me to learn independently.	79,28%

DOI: 10.24952/lavoisier.v3i1.1111

3.	I am comfortable learning using technology in flipped classroom learning with microlearning.	73,75%
4.	I find flipped classroom learning with microlearning very interesting and fun.	76,42%
5.	Learning using the flipped classroom model with microlearning makes me more focused on learning	69,28%
6.	I find it easier to remember learning using the flipped classroom model with microlearning	77,85%

From the results above, it can be said that this flipped classroom learning model with microlearning can provide a good student response. This is following the research of Zakhia & Dermawan (2021) that students gave a positive response to the flipped classroom learning model.

4) Indicators of learning activity

Based on the questionnaire results, it is found that students are more active when learning takes place. According to Suardipa, et al (2022) in a flipped classroom learning each individual in the classroom learns independently and is active individually at home by watching video content created by the teacher. Flipped classroom learning provides space for students' active participation and encourages the development of an interactive learning environment (Turan, Z., & Akdag Cimen, B, 2019). Learners stated that learners learn more to prepare themselves for learning. The flipped classroom learning model leads to learners' self-learning readiness to participate when in-class learning takes place. (Sonia, 2022).

Learners stated that the flipped classroom model with microlearning can facilitate learners in conducting independent learning. Where in this learning, students can do independent learning outside of learning hours or outside the classroom, anytime and anywhere through learning materials that have been provided by the teacher on an online platform. Learners stated that discussions during class hours can improve learners' ability to answer questions and understand learning materials.

Table 5. Learning activity indicator questionnaire results

No	Questionnaire	Result
1.	Flipped classroom learning with microlearning makes me more active in learning	77,85%
2.	Flipped classroom learning with microlearning makes me learn more to prepare myself for this learning.	77,14%
3.	Using the flipped classroom model with microlearning makes it easier for me to learn independently	75,71%

DOI: 10.24952/lavoisier.v3i1.1111

4.	Conducting discussions during chemistry lessons can improve my ability to answer questions and understand knowledge.	72,85%

Based on the description above, it can be concluded that with flipped classroom model learning using microlearning, learning activities can run well. The design of the flipped classroom model provides more time for students to engage in the learning process actively, thus increasing the effectiveness of the learning process (Strelan, P., et al, 2020).

5) Learning outcome indicators

It was found that 85.71% of students in class XI MIPA 3 managed to get a score exceeding the Minimum Completeness Criteria (KKM). This is following the statement (Yusuf, 2018) that the teaching and learning process is said to be complete for one class if at least 85% of the class, who get learning outcomes reach the minimum completeness criteria. These results prove that the flipped classroom model with microlearning can be implemented well because most of the students' scores pass the minimum completeness criteria.

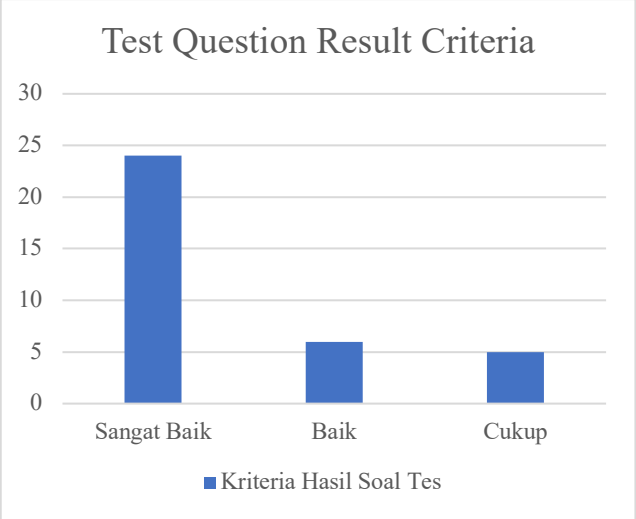

Figure 4. Diagram of student learning outcomes

5. Conclusions

Based on the discussion of the results of research with flipped classroom model learning can be applied by using microlearning media in learning in this digital era. Learning with the flipped classroom model using microlearning can be analyzed for its effectiveness through five indicators, namely on the indicator of learning implementation management can run well and structured, this can be seen from the suitability of the learning process with the Learning Implementation Planz. On the

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indicator of the communicative learning process, learning with a flipped classroom model using microlearning on buffer solution material can be said to be good. This can be seen from the interaction between students and teachers.

On the indicator of learner response, learning the flipped classroom model with microlearning can provide a good or positive learner response. This can be seen from the achievement of students in increasing their enthusiasm for learning, learning independently, and interesting and fun learning. On learning activity indicators, it is known to run well. This can be seen from the activities of students in learning, where students are more active in preparing themselves for learning and in learning. On the learning outcomes indicator, the flipped classroom learning model with microlearning is known to be well implemented. This can be seen from the value of the learning outcomes of students, most of whom pass the Minimum Criteria (KKM). From the success of each indicator, it can be concluded that this flipped classroom model learning with microlearning is effective for use in buffer solution material.

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References

Abdussamad, Z. (2021). Metode Penelitian Kualitatif. CV. Syakir Media Press.

Adhipertama, M. C. (2020). The Development of Learning Video Based on Micro-Learning Principle Towards Science Subject in Junior High School. *INDONESIAN JOURNAL OF EDUCATIONAL RESEARCH AND REVIEW, 3*(3), 132-143.

Anggraeni, P., & Akbar, A. (2018). Kesesuaian Rencana Pelaksanaan Pembelajaran dan Proses Pembelajaran. Jurnal Pesona Dasar, 6(2), 55-65.

Ardiana, N. A., Parmidin, & Wijiayanto, Z. (2020). Efektivitas Model Pembelajaran Flipped Classroom Ditinjau dari Disposisi Matematis Siswa Kelas VIII SMP. *UNION: Jurnal Pendidikan Matematika, 8*(2), 193-203.

Cho, M.-H., Park, S. W., & Lee, S. (2019). Student characteristics and learning and teaching factors predicting affective and motivational outcomes in flipped college classrooms. Studies in Higher Education, 46(3), 509–522.

Damayanti, H. N., & Sutama. (2016). Efektivitas Flipped Classroom Terhadap Sikap Danketrampilan Belajar Matematika Di SMK. *Jurnal Manajemen Pendidikan, 11*(2), 2-8.

Elpina, N., & Haris, D. (2023). Pengembangan Modul Pembelajaran Mobile Berbasis Microlearning dalam Flipbook pada Materi Sistem Persamaan Linear Dua Variabel di Kelas X di SMAN 1 Sorkam. *Journal on Education, 5*(2).

DOI: 10.24952/lavoisier.v3i1.1111

Ishak, T., Kurniawan, R., & Zainuddin, Z. (2019). Implementasi Model Pembelajaran Flipped Classroom Guna Meningkatkan Interaksi Belajar Mahasiswa pada Mata Kuliah Manajemen Informasi dan E-Administrasi. Jurnal Kajian Teknologi Pendidikan, 4, 89-95.

Mandasari, B., & Wahyudin, A. Y. (2021). Flipped Classroom Learning Model: Implementation and Its Impact on EFL Learners' Satisfaction on Grammar Class. Ethical Lingua: Journal of Language Teaching and Literature, 8(1), 150-158.

Sankaranarayanan, R., Leung, J., Lachheb, V. A., Seo, G., & Lachheb, A. (2022). Microlearning in Diverse Contexts: A Bibliometric Analysis. TechTrends.

Saputra, M. E., & Mujib. (2018). Efektivitas Model Flipped Classroom Menggunakan Video Pembelajaran Matematika terhadap Pemahaman Konsep. *Jurnal Matematika, 1*(2), 173-179.

Shail, Mrigank. (2019). Using Micro-learning on Mobile Applications to Increase Knowledge Retention and Work Performance: A Review of Literature. Cureus. 11.

Sinaga, D. H., Hutasoit, L. T., Pangaribuan, E., & Simanjuntak, R. M. (2022). Efektivitas Model Pembelajaran Microlearning Berbantu Video Terhadap Kemampuan Pemahaman Konsep Matematika Siswa Kelas VII SMPN 5 Air Putih T.A. 2022/2023. SEPREN: Journal of Mathematics Education and Applied, 48-56.

Sonia, N. R. (2022). Model Flipped Classroom : Alternatif Pembelajaran Di Era New Normal Bagi Siswa Sekolah Dasar. Jurnal Kependidikan Dasar Islam Berbasis Sains, 26-42.

Strelan, P., Osborn, A., & Palmer, E. (2020). The flipped classroom: A meta-analysis of effects on student performance across disciplines and education levels. Educational Research Review, 30, 1-2.

Suardipa, I. P., Senada, I. M., & Handayani, N. N. (2022). Pembelajaran Flipped Classroom Konten E learning. EdukasI: Jurnal Pendidikan Dasar, 3, 45-52.

Susilana, R., Dewi, L., Rullyana, G., Hadiapurwa, A., & Khaerunnisa, N. (2022). Can microlearning strategy assist students' online learning? Jurnal Ilmiah Pendidikan, 41(2), 437-451.

Turan, Z., & Akdag-Cimen, B. (2019). Flipped classroom in English language teaching: a systematic review. Computer Assisted Language Learning, 33(5-6), 590–606.

Yanuarto, W. N. (2018). Flipped Classroom Learning Modeluntuk Menumbuhkan Kemandirian Belajar Matematika Dan Memaksimalkan Peran Teknologi Pada Pendidikan. Jurnal Pendidikan Matematika, 1(1), 13-19.

Yusuf, B. B. (2018). Konsep dan Indikator Pembelajaran Efektif. Jurnal Kajian pembelajaran dan dan keilmuan, 13-20.

Zakhia, F. Y., & Dermawan, D. A. (2021). Penerapan Flipped Classroom Pada Mata Pelajaran Pemrograman Berorientasi

Objek Sebagai Solusi Pembelajaran Daring Dimasa Pandemi Di Smkn 2 Surabaya. Jurnal IT-EDU, 5(2), 667-684.

Zarshenas, L., Mehrabi, M., karamdar, L., Keshavarzi, M. H., & keshtkaran, Z. (2022). The effect of micro-learning on learning and self-efficacy of nursing students: an interventional study. *BMC Med Educ, 22*(664).

DOI: 10.24952/lavoisier.v3i1.1111

DOI: 10.24952/lavoisier.v3i1.1111