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Flipped Classroom Limited Face-to-Face Learning: A Bibliometric Study

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ABSTRACT

The writing of this article is motivated by the government's policy of limiting learning activities in schools due to the covid-19 pandemic that has not ended. This research first revealed articles related to flipped classroom on mathematics learning to explore themes and opportunities for future research. The research method uses bibliometric analysis assisted by Publish or Perish (PoP) and VOSviewer. With the google scholar database study, there are research articles about flipped classrooms published in scientific journals in the last ten years starting from 2011 to 2021. The keywords used are related to the application of flipped classroom to mathematics learning during the Limited Face-to-Face Learning (PTMT) period. Search results obtained 500 articles, and after selection, 428 articles were obtained that qualified as samples. The selection results on PoP are stored in RIS form and analyzed using VOSviewer with the full counting method so that 2870 terms are obtained. Verification is carried out by selecting terms that are relevant and intersect with the theme and eliminate those that do not match. The results of bibliometric analysis related to flipped classroom in mathematics learning show that variables with research potential in the future are flipped classroom approach, flipped classroom methods, mathematical concept, combination, impact, evectiveness and learning process.

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1. INTRODUCTION

Realizing the importance of Face-to-Face Learning for (PTM) students, the government hasissued guidelines for the implementation of Limited Face-to-Face Learning (PTMT) for education units that are ready to carry out face-to-face schooling with strict health procedures that must be followed and school domiciles are included in areas that have been declared safe from the declining spread of covid. Although it has only been implemented by several schools, since July 2020 limited face-to-face learning

has been carried out as a trial stage. Research on the application of PTMT shows that it is not successful in achieving learning goals due to the lack of use of learning models to improve student learning activities (La Ode Onde, Aswat, Sari, & Meliza, 2021).

Face-to-face learning today is not face-to-face learning as before, from the number of days of implementation, the length of time students are present in school, and from the application of different curricula (Ansori & Sari, 2020). Education units differ from one to another so that educational units are given the flexibility to manage students' learning time and days. Students can come to school in turn. The arrangement of learning days is conditional and situational, meaning that every school in implementing PTMT does not have to be the same (Stevens, Bienz, Wali, Condie, & Schismenos, 2021). The curriculum applied during the COVID-19 pandemic is also adjusting. Schools can implement national curricula, essential curricula, or self-developed curricula (Safitri, Putri, Fauziyyah, & Prihantini, 2021). Furthermore, the existence of an independent learning program from the Ministry of Education and Culture provides flexibility to educational units in compiling the right curriculum according to needs and applying the right learning strategies as well. Learning that not only demands completeness of the material (Gusty et al., 2020).

Teaching and Learning activities will provide optimal results if direct communication is established between students and educators and between students and students (Kristanto, 2020). For this reason, it is important to have face-to-face in schools. In the period of Distance Learning, communication is carried out by utilizing communication technology with the internet which is now very remarkable in its development (Latip, 2021). Although PJJ itself does not actually have to be always in the network or known as online, it can also be carried out offline (being outside the network) or online and offline combined. LimitedPTM communication can occur through direct interaction in schools as part of strengthening learning activities at home through the use of technology (Shadiqien, 2020).

In the world of education the trend of learning methods is always changing, following developments. In the past, just a teacher speaking in class might be enough. Then it develops how to get students actively involved in learning. Technology is developing rapidly influencing learning trends, especially information and communication technology changing performance standards in the world of education (Kang, Kim, Kim, & You, 2012). How to prepare students, the provision of student abilities becomes a challenge of the 21st century so that students become graduates who are able to compete. Everylearner must have 21st century skills. Knowledge and skills synergize with each other. Critical in thinking, able to solve problems, skills to convey ideas or ideas, and being able to work together in a team or collaborate are the demands of today (Rotherham & Willingham, 2009). *Flippled classrooms* address the challenges of change in learning by combining the roles of conventional classrooms and technology.

The world of education must adapt to the development of information technology where education in the digital era teachers must be able to present simple, effective, and efficient learning by utilizing information technology where space and time are no longer a barrier, documenting digitally, providing online learning innovations, and smartphones are one of the means that can be utilized (Maulidah, 2019). *Flipped classroom is* a learning model whose learning method is unusual, namely reversing old habits where student activities that have been done at home are done at school and those that were previously done at school are done at home (Güvenç, 2018). The goal is to maximize learning activities This condition is similar to the current conditions where students' learning time at school is greatly reduced. In the current conditions where face-to-face learning hours are reduced and students become more at home, *flipped classrooms* are becoming a learning trend. *The flipped concept of Classroom* is to reverse learning procedures (Tucker, 2012) andwith technology teachers can be interactive with students at home via video or otherwise. Students understand concepts at home. At school students can collaborate to solve problems. Before studying at school, students are asked by the teacher to study the material at home.

Flipped classrooms in learning have been widely researched and claimed to have an impact on both students, both in the learning process and based on learning outcomes. Many studies on *flipped classrooms* prove that the application of this learning model can encourage students' enthusiasm for learning. Students become happier, more creative, and learning outcomes get better. In the positive part of the implementation of Limited PTM, students have the opportunity to adapt to new behaviors. Students and teachers try to implement blended learning that combines PTM and PJJ (Adi, Oka, & Wati, 2021). Together with teachers and classmates, students try to carry out blended learning that combines the two. The application of *flipped classrooms* has a positive impact on student achievement (Huda, Dhewy, & Agustina, 2021). Thus, learning technology has contributed to student learning achievement, motivation, engagement, and interaction. Learningindependently before studying in class is challenging and requires effort from students. Diligent students are highly motivated and students have difficulties requiring peer assistance in understanding encouraging the creation of *peer teaching* among students (Umam, Nusantara, Parta, Hidayanto, & Mulyono, 2019).

The application of *flipped classrooms* can improve the quality of learning. This is because with the help of communication and information technology devices at home, students can see the material repeatedly according to their ability to understand the material (Milman, 2012). In line with that, with *flipped classrooms* students have the potential to absorb much more learning materials because there is an active interaction between teachers and students both at school and outside of school (Imania & Bariah, 2020). With the *flipped classroom* model, students are able to interpret their abilities and become much more responsible for their learning but their workload does not increase (Blair, Maharaj, & Primus, 2016). Learners come to school not to simply record material but to solve complex problems together with their friends, or with their teachers (Steed, 2012). Metode *flipped classroom* allows teachers to spend as much time as students and allows students to complete assignments faster. *Flipped classroom* succeeds in increasing understanding of concepts in students because it is influenced by a good learning experience and is able to build student confidence, believe in their abilities (Marina & Ridlo, 2021).

Flipped Classroom, which is collaborated with other methods, can be one of the learning methods during the COVID-19 pandemic, especially in the application of Limited Face-to-Face Learning where only a little time in class becomes more quality because teachers are challenged to devise strategies that are not only interesting but also accommodate the diversity of students' talents and interests. For educators, *flipped classrooms* make it easy to monitor the progress of students. So it is appropriate if *flipped classrooms* become research materials to be developed and implemented in conjunction with other learning methods. In the current conditions where face-to-face learning hours are reduced and students become more at home, *flipped classrooms* are becoming like the solution of today's learning strategies and can be a solution for the future where technology plays a big role.

Publish or perish (PoP) is used by authors to collect article data about *flipped classrooms* indexed by Google Scholar. *Publish or perish* is software designed to help with article reference search. By browsing the PoP metadata, a variety of articles that match the content can be collected. By *publishing or perish* the collection of scientific articles that fit the criteria becomes easy (Parchomovsky, 2000). PoP provides protection to the author or researcher for the findings in the research that has been carried out, gives the power of property rights to the work, makes the previous discovery a reference for evaluating the next discovery.

Google scholar is an author's choice not another source of data because of its more general, *free*, and *open access* nature. Articles contained in google scholar collected on PoP are also reference material in writing this article. Google Scholar is the world's largest provider of journal search and scientific references with a very wide range of publication components (Sejati, 2019). Almost all types of publications, both paid and unpaid, are included in Google Scholar and are easy to find. The amount of data that can be accessed is greater than any other database. Google scholar is very easy and familiar with the database of journals published in Indonesia because it uses the *Open Journal System* platform (Sejati, 2019).

Bibliometric analysis research related to flipped classroom with flipped classroom and inverted classroom keywords in general in the 2000-2015 interval concluded that "active learning" and "blended learning" were the two most researched keywords (Yang, Sun, & Liu, 2017). The search was carried out before the covid pandemic occurred, therefore it will draw the results of the analysis carried out in 2019 and above. Recent research related to flipped classrooms in general in the range of 2007-2021 has been carried out using web of science databases, and recommends qualitative and quantitative research to analyze the potential of flipped classrooms (del Arco, Mercadé-Melé, Ramos-Pla, & Flores-Alarcia, 2022).

This research first revealed research trends and research gaps with the keyword "flipped classroom in mathematics learning" usingn software Publish or Perish and VOSviewer as a metadata extraction store that the authors use to obtain *network* visualizations, *overlay* visualizations, and *density* visualizations . Bibliometric analysis on VOSviewer was conducted to explore themes that still have the opportunity to be researched in the future.

2. METHODS

Google Scholar's database of 500 publications was collected starting in 2021 ten years ago. Bibliometric analysis methods are used to view and analyze flipped classroom-related data. Data collection using *Publish or Perish* (PoP). Out of 500 articles taken 428 articles to be visualized by using VOSviewer.

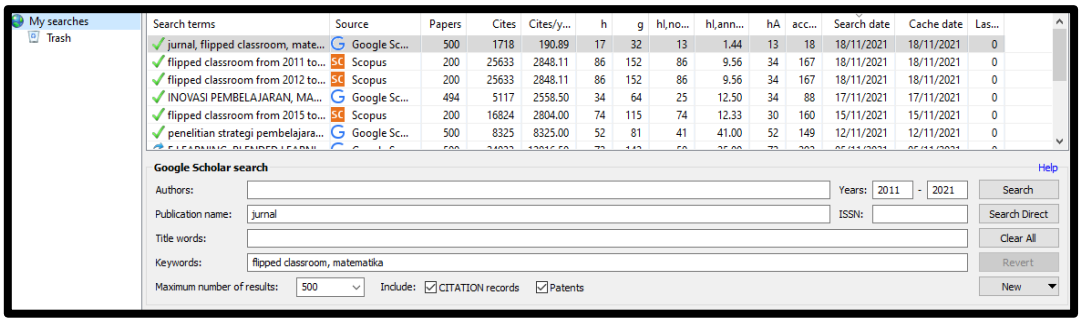

Figure 1. Google Scholar Database Search on Publish or Perish (PoP)

The collection of secondary data on Google Scholar related to *Flipped Classroom* in mathematics learning on Publish or Perish (PoP) by writing the keywords "*flipped classroom*" and "mathematics" in the *range* of 2011 to 2021 is the first step taken as shown in Figure 1. Furthermore, the data obtained from the search results is stored in RIS format so that it can be visualized with VOSviewer seen in Figure 2, to see the development of scientific publications *flipped classroom* mathematics learning.

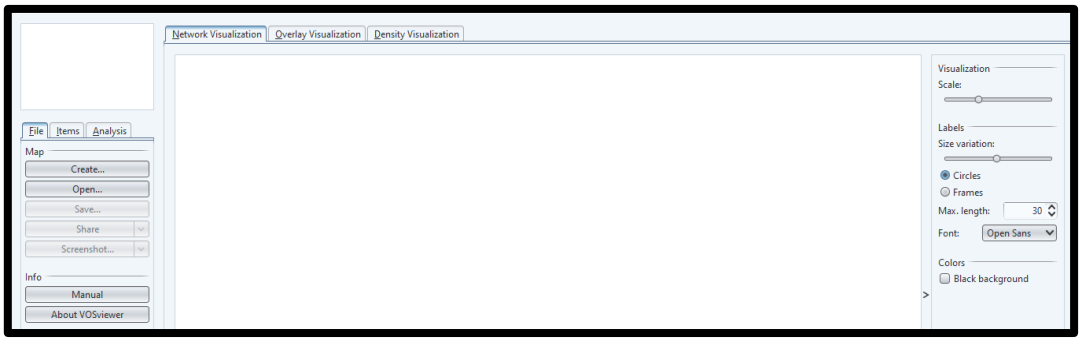

Figure 2. Data Visualization with VOSviewer

Among the types of documents, meeting abstracts, proceedings papers, corrections, theses, and book chapters are excluded from the study (Ajinegara & Soebagyo, 2022). As material for literacy

information when looking for articles about *flipped classrooms* on PoP is not limited to journals. Publications unrelated to *flipped classroom* topics and mathematics learning were also excluded, a total of 428 saved in RIS format. VOSviewer software is used to retrieve, analyze and visualize information about the publication of articles with a defined theme. From 428 articles extracted based on article title and abstract, *the full counting* method was chosen (Karim & Soebagyo, 2021) and the VOSviewer software that appears on Figure 3, finds 2870 terms or keywords, the minimum number of the same term out of 2870 is selected 5 and finds 84 keywords that meet the threshold to then calculate their relevance score. For all keywords, the total strength of shared event links is calculated in relation to other keywords.

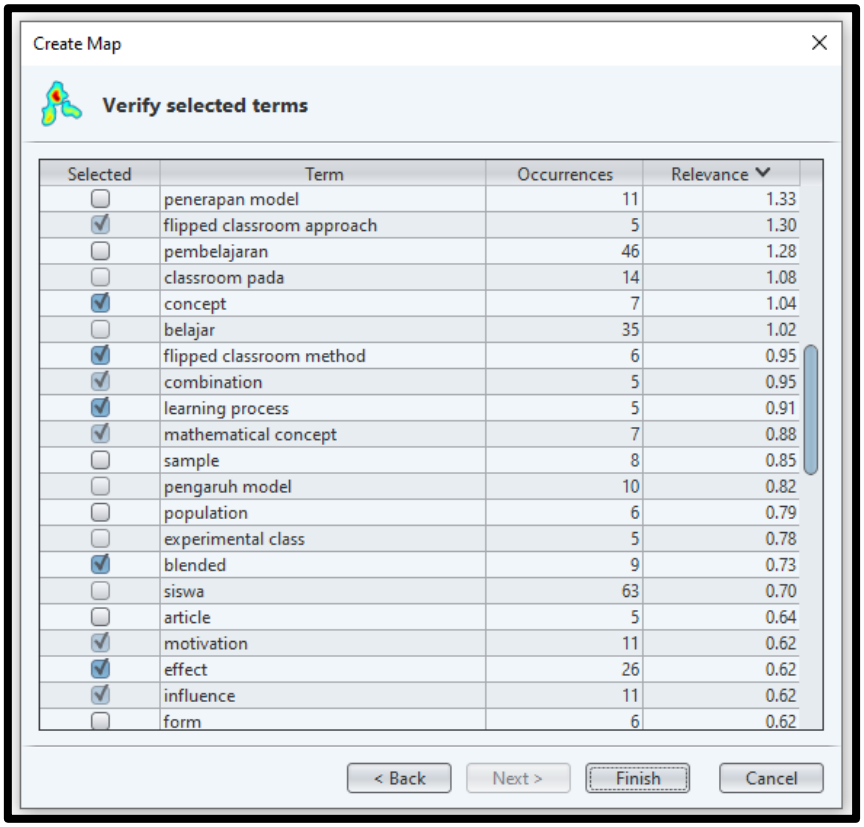

Figure 3. Verify Selected Terms

3. FINDINGS AND DISCUSSION

The network map based on keywords is the result of visualization of VOSviewer as shown in Figure 4. There are 5 colors that indicate there are 5 different groups where terms or keywords are associated with each other. The largest groups are shown in red: *combination, effectiveness, flipped classroom method, flipped classroom model, implementation, learning process, mathematics, project,* and *skills*. The second group is shown in green: ability, analysis, application, concept, *experimental class, impact,* and *mathematical concept*. The third group is shown in blue: *effect, flipped classroom approach, outcome, student,* and *study*. The fourth group is visualized in yellow: *blended learning, flipped classroom, mathematics learning, problems,* and *teachers*. And the least group is visualized in purple: *achievement, influence,* and *motivation*. The blended learning variable in the yellow cluster was a similar finding in bibliometric analysis in the 2000-2015 range (Yang et al., 2017). Meanwhile, the flipped classroom method variable in the red cluster is relevant to the findings of other studies as an alternative learning method to improve student learning achievement. (Supriatna, 2021).

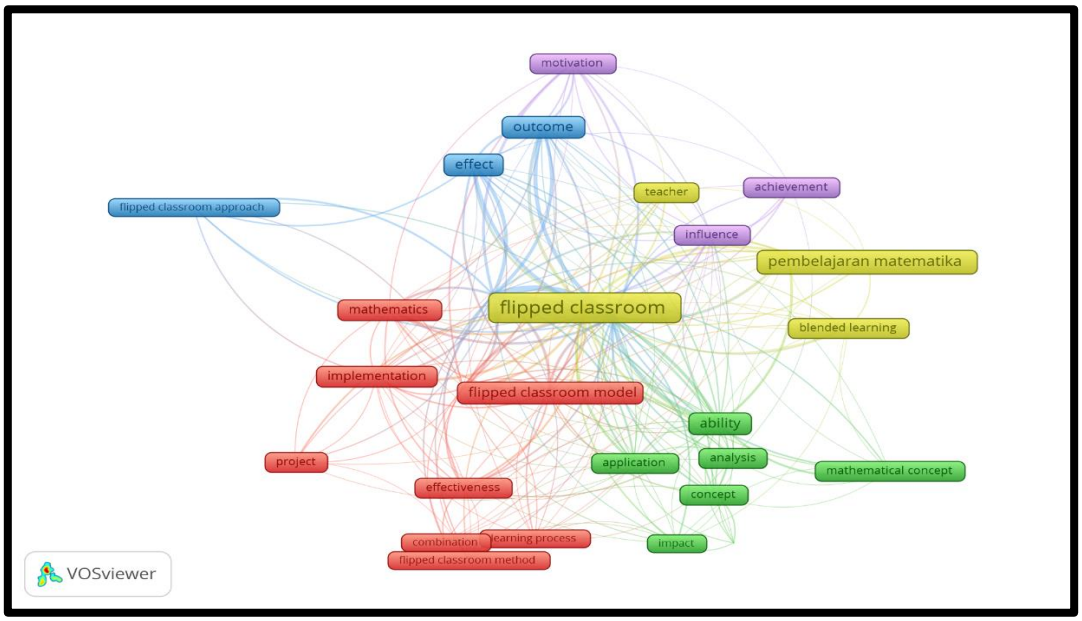

Figure 4. Flipped Classroom Cluster with Network Visualization Mode

The VOSviewer results in Figure 5 show a strong relationship between *flipped classroom* and 28 other keywords shown in bold lines. This means that *flipped classroom* itself is the main theme or discussion in research and is most researched related to mathematics learning. In addition to being thickly connected, it can also be seen that *flipped classrooms* are visualized the most. This result is similar to the findings of other studies except that it differs in that the keyword flipped classroom in general and there are 6 clusters using the web of science database (del Arco et al., 2022).

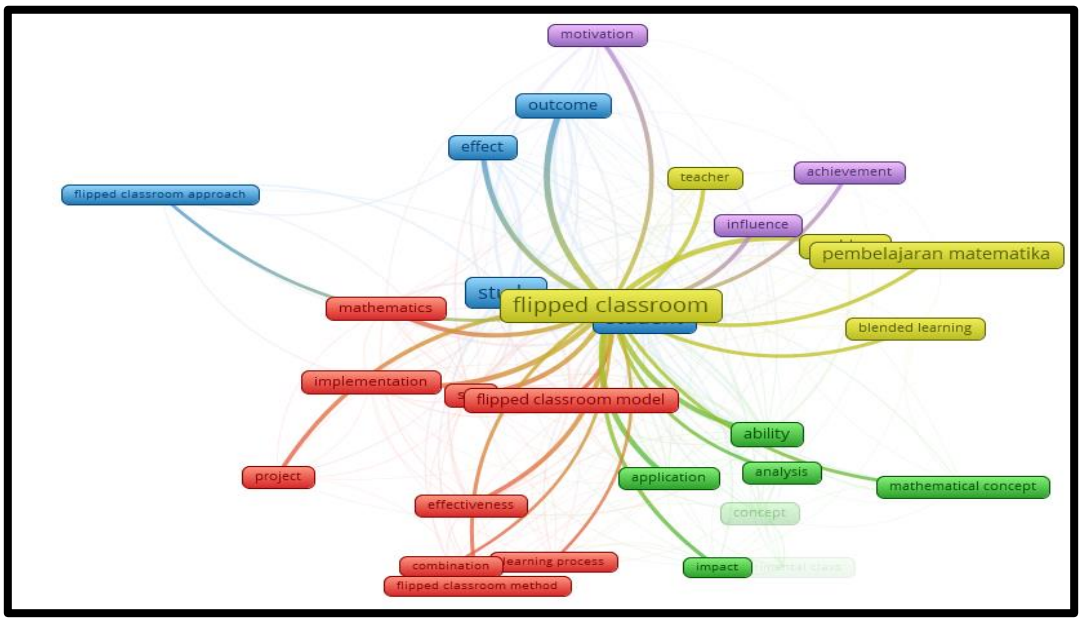

Figure 5. Flipped Classroom Networking

The VOSviewer *overlay visualization* in Figure 6 shows that *flipped classrooms* are not a new theme from many studies that have been done. Based on findings on Google Scholar, flipped classrooms have been researched since 2000 and J. Wesley Baker, Ph.D. was the first to write about *flipped classrooms*. Long before 2000, in 1991, Eric Mazur of Harvard University applied learning in the classroom with the outside (Utami, 2017). In the span of 2011 to 2021, based on *flipped classroom* visualization, it was widely

studied in 2018. Meanwhile, the theme related to flipped classroom that was studied starting in mid-2019 is the *flipped classroom approach* which is connected to *analysis, projects,* and *blended learning*.

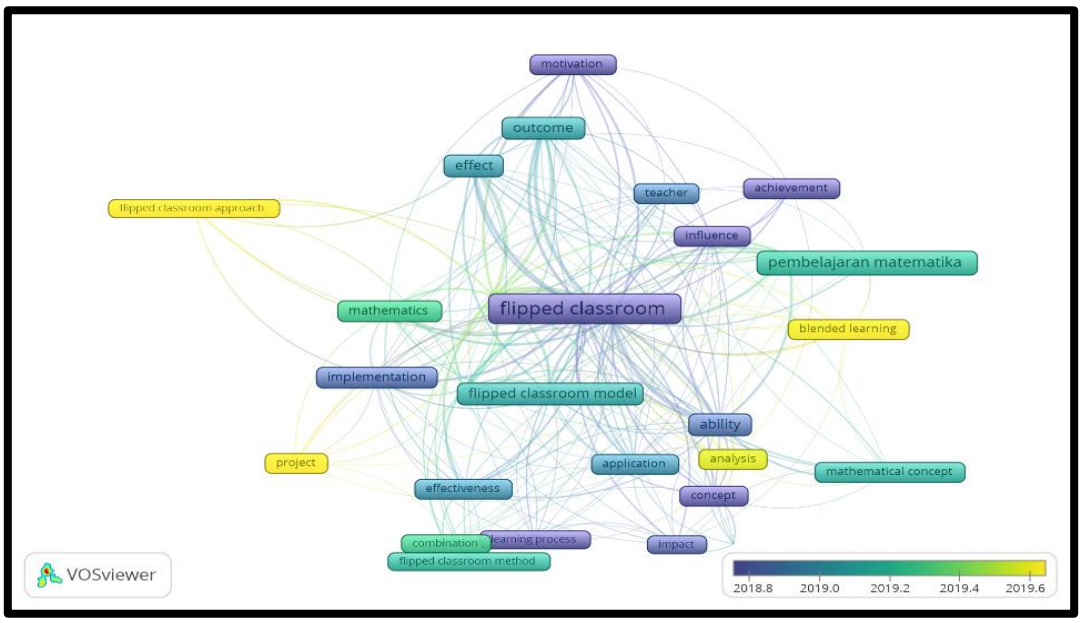

Figure 6. Overlay Visualization

The VOSviewer results in Figure 7 (*density visualisization*) clarify the theme that has been widely studied, namely about flipped classroom itself, then *flipped classrooms* that are connected to learning and students shown with light colors. While other themes related to flipped classrooms that are still little studied include flipped classroom *approach, flipped classroom methods*, *mathematical concept*, combination, impact, *evectiveness, blended* learning and *learning process*. Of course, it is related to learning mathematics. It is indicated by a dim color. So that the dimly colored research theme can be a reference theme for further research.

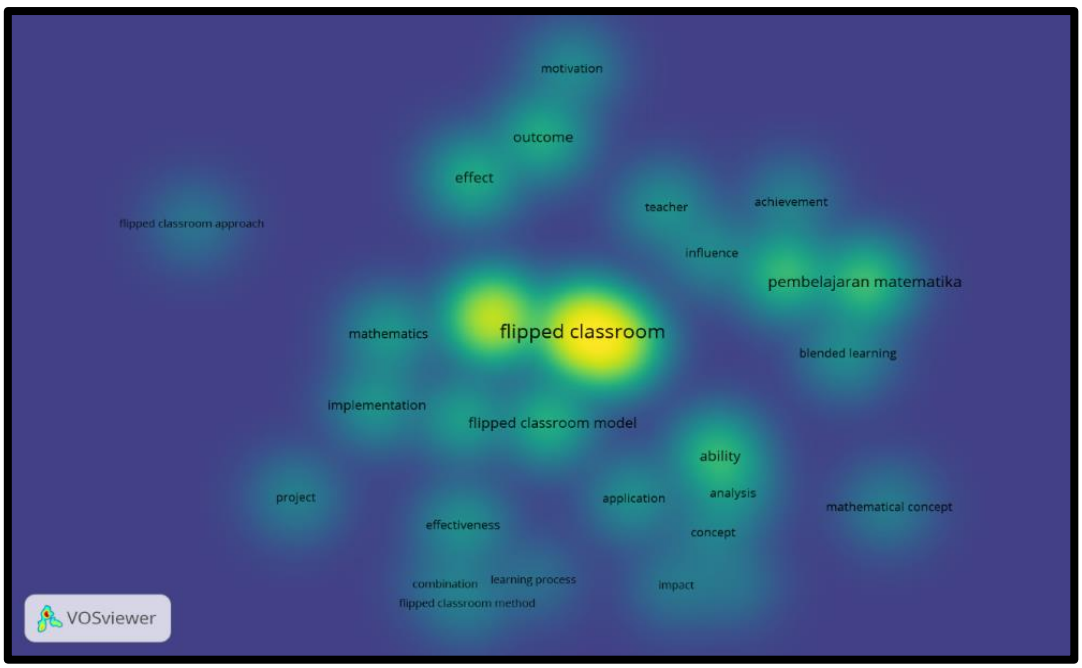

Figure 7. Density Visualization

Our previous research on biblometric analysis of blended learning in mathematics learning shows a close relationship between blended learning and flipped classrooms. However, uniquely the network of the two is not directly connected but through a mathematical theme first (Eryanti & Soebagyo, 2021). That is, the keyword flipped classroom is unique and still rarely researched. If we do a search on google with the keyword "flipped classroom for Limited Face-to-Face Learning" on November 26, 2022 at 22.11 WIB only one study was found. This signals the relevance of the findings of lack of research to these variables.

Flipped classroom approach has been researched by Fezile Ozdamli dan Gulsum Asiksoy that states in future studies it is necessary to carry out further analysis related to the application of the reverse class approach. According to them that to keep pace with the educational demands of 21st century students, it is important to use innovative approaches in Education (Ozdamli & Asiksoy, 2016). And that approach is a *flipped classroom* approach that at the time was still not widely applied. In line with Fezile Ozdamli and Gulsum Asiksoy, (Lo, 2018) said more research needs to be done on the reverse classroom approach to improve the robuster design framework so that the implementation of the best classroom approach in schools can improvesaid more research needs to be done on the reverse classroom approach to improve the robuster design framework so that the implementation of the best classroom approach in schools can improve. *Flipped classroom* research has been widely conducted in various disciplines and levels of education but it is still interesting to look at. It is part of *blended learning* but *flipped classroom* itself is still divided into several approaches that have not been studied much. Then in addition, *flipped classrooms* are right to be combined with other models and even their application to mathematics learning is wide open to research topics.

In previous studies, many of the objects of research were students. Teachers being the object of research are still little done. Another is the effectiveness of flipped classroom which has been studied by comparing the results in example classes or classes with the application of flipped classrooms with classes without the application of *flipped classrooms*, one of which is done by (Saputra & Mujib, 2018) who in his research used a learning video in his experimental class and found that classes with a flipped classroom model were better than classes that were not *applied flipped classrooms*, but did not give too significant results. This is possible because the application of *flipped classrooms* in the observation class is limited. The flipped Classroom model research combined with a learning method is also visible in the visualization of VOSviewer overlays with small writing with not bright colors, meaning that it is still open for follow-up. The effectiveness of *flipped classrooms* associated with a combination of methods and comparative test results between the experimental class and the control class is also open to be carried out.who in his research used a learning video in his experimental class and found that classes with a flipped classroom model were better than classes that were not *applied flipped classrooms*, but did not give too significant results. This is possible because the application of *flipped classrooms* in the observation class is limited. The flipped Classroom model research combined with a learning method is also visible in the visualization of VOSviewer overlays with small writing with not bright colors, meaning that it is still open for follow-up. The effectiveness of *flipped classrooms* associated with a combination of methods and comparative test results between the experimental class and the control class is also open to be carried out.

4. CONCLUSION

Although it is not a new learning model, the presence of a *flipped classroom* model is one of the good choices to be implemented today. Freedom of learning, technological advances, restrictions on space and time for face-to-face in schools as a result of the prolonged Covid-19 pandemic seem to support that the *flipped classroom* model is a solution for the implementation of Limited Face-to-Face Learning. For this reason, studies that examine the effectiveness of the application of *flipped classrooms* or the merger of *flipped classrooms* with other learning methods are needed to support previous research. It is also necessary to conduct new research that can contribute to learning in Indonesia, especially in the current conditions of the Covid pandemic.

The results of this study recommend the variables flipped classroom *approach, flipped classroom methods*, *mathematical concept*, *combination*, *impact, evectiveness* and *learning process* in the next study. The downside to this article is that it doesn't limit it to the *flipped classroom* model applied. Open research by taking one of the existing models in the *flipped classroom* and applying it in a limited learning period like today.

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REFERENCES

Adi, N. N. S., Oka, D. N., & Wati, N. M. S. (2021). Dampak Positif dan Negatif Pembelajaran Jarak Jauh di Masa Pandemi COVID-19. *Jurnal Imiah Pendidikan Dan Pembelajaran*, *5*(1), 43. https://doi.org/10.23887/jipp.v5i1.32803

Ajinegara, M. W., & Soebagyo, J. (2022). Analisis Bibliometrik Tren Penelitian Media Pembelajaran Google Classroom Menggunakan Aplikasi VOSViewer. *JNPM (Jurnal Nasional Pendidikan Matematika)*, *6*(1), 193–210.

Ansori, A., & Sari, A. F. (2020). Inovasi Pendidikan di Masa Pandemi Covid-19. *Jurnal Literasi Pendidikan Nusantara*, *1*(2), 133–148. Retrieved from http://jurnal.uinbanten.ac.id/index.php/jlpn/article/view/3735

Blair, E., Maharaj, C., & Primus, S. (2016). Performance and perception in the flipped classroom. *Education and Information Technologies*, *21*(6), 1465–1482.

del Arco, I., Mercadé-Melé, P., Ramos-Pla, A., & Flores-Alarcia, Ò. (2022). Bibliometric analysis of the flipped classroom pedagogical model: Trends and strategic lines of study. *Frontiers in Education*, *7*. https://doi.org/10.3389/feduc.2022.1022295

Eryanti, I., & Soebagyo, J. (2021). Bibliometric Analysis of Blended learning Mathematics in Scientific Publications Indexed by Scopus. *Numerical: Jurnal Matematika Dan Pendidikan Matematika*, 91–102.

Gusty, S., Nurmiati, N., Muliana, M., Sulaiman, O. K., Ginantra, N. L. W. S. R., Manuhutu, M. A., … Sahabuddin, A. A. (2020). *Belajar Mandiri: Pembelajaran Daring di Tengah Pandemi Covid-19*. Yayasan Kita Menulis.

Güvenç, G. (2018). The flipped classroom approach in teaching writing: An action research. *International Journal of Social Sciences and Education Research*, *4*(3), 421–432. https://doi.org/10.24289/ijsser.434493

Huda, M., Dhewy, R. C., & Agustina, E. N. S. (2021). Implementasi Blended Learning Model Flipped Classroom: Peran Teknologi Dalam Pembelajaran Matematika di Tengah Pandemi. *Jurnal Edukasi Matematika*, *2*(1), 1–8. Retrieved from https://repository.stkippgri-sidoarjo.ac.id/1301/

Imania, K. A., & Bariah, S. H. (2020). Pengembangan Flipped Classroom Dalam Pembelajaran Berbasis Mobile Learning Pada Mata Kuliah Strategi Pembelajaran. *Jurnal Petik*, *6*(2), 45–50.

Kang, M., Kim, M., Kim, B., & You, H. (2012). Developing an instrumen to measure 21st century skills for elementary student. *The Korean Journal of Eductional Methodolocy Studies*, *25*(2).

Karim, A., & Soebagyo, J. (2021). Pemetaan Bibliometrik Terhadap Trend Riset Matematika Terapan Di Google Scolar Menggunakan Vosviewer. *Teorema: Teori Dan Riset Matematika*, *6*(2), 234–241. https://doi.org/10.25157/teorema.v6i2.5835

Kristanto, Y. D. (2020). *Covid-19, Merdeka Belajar, dan Pembelajaran Jarak Jauh*.

La Ode Onde, M. K., Aswat, H., Sari, E. R., & Meliza, N. (2021). Analisis Pelaksanaan Pembelajaran Tatap Muka Terbatas (TMT) di masa New Normal terhadap Hasil Belajar Matematika di Sekolah Dasar. *Edukatif : Jurnal Ilmu Pendidikan*, *3*(6), 4400–4406. https://doi.org/10.31004/edukatif.v3i6.1449

Latip, A. (2021). Peran Literasi Teknologi Informasi Dan Komunikasi Pada Pembelajaran Jarak Jauh Di Masa Pandemi Covid-19. *EduTeach: Jurnal Edukasi Dan Teknologi Pembelajaran*, *1*(2), 107–115. https://doi.org/10.51878/edutech.v1i1.176

Lo, C. K. (2018). Grounding the flipped classroom approach in the foundations of educational technology. *Educational Technology Research and Development*, *66*(3), 793–811.

Marina, H., & Ridlo, S. (2021). The Effectiveness of Flipped Classroom to Improve Students' Concept Understanding and Self Efficacy during the Covid-19 Pandemic. *Journal of Biology Education*, *10*(1), 70–76.

Maulidah, E. (2019). character building dan keterampilan abad 21 dalam pembelajaran di era revolusi indutri 4.0. *Prosiding Seminar Nasional PGSD UST*, *1*.

Milman, N. B. (2012). The flipped classroom strategy: What is it and how can it best be used? *Distance Learning*, *9*(3), 85.

Ozdamli, F., & Asiksoy, G. (2016). Flipped classroom approach. *World Journal on Educational Technology: Current Issues*, *8*(2), 98–105.

Parchomovsky, G. (2000). Publish or perish. *Michigan Law Review*, *98*(4), 926–952.

Rotherham, A. J., & Willingham, D. (2009). 21st century. *Educational Leadership*, *67*(1), 16–21.

Safitri, A., Putri, F. S., Fauziyyah, H., & Prihantini, P. (2021). Pendidikan di Masa Pandemi Covid-19 dalam Penerapan Kurikulum 2013. *Jurnal Basicedu*, *5*(6), 5296–5304. https://doi.org/10.31004/basicedu.v5i6.1631

Saputra, M. E. A., & Mujib, M. (2018). Efektivitas Model Flipped Classroom Menggunakan Video Pembelajaran Matematika terhadap Pemahaman Konsep. *Desimal: Jurnal Matematika*, *1*(2), 173. https://doi.org/10.24042/djm.v1i2.2389

Sejati, A. W. (2019). Pemanfaatan Open Data untuk Mencari Jurnal dan Referensi Ilmiah. *Res. Gate*.

Shadiqien, S. (2020). Efektifitas Komunikasi Virtual Pembelajaran Daring dalam Masa PSBB (Studi Kasus Pembelajaran Jarak Jauh Produktif Siswa SMK Negeri 2 Banjarmasin). *Jurnal Mutakallimin : Jurnal Ilmu Komunikasi*, *3*(1). https://doi.org/10.31602/jm.v3i1.3573

Steed, A. (2012). The flipped classroom. *Teaching Business & Economics*, *16*(3), 9.

Stevens, G. J., Bienz, T., Wali, N., Condie, J., & Schismenos, S. (2021). Online university education is the new normal: but is face-to-face better? *Interactive Technology and Smart Education*, *18*(3), 278–297. https://doi.org/10.1108/ITSE-08-2020-0181

Supriatna, U. (2021). Flipped Classroom: Metode Pembelajaran Tatap Muka Terbatas pada Masa Pandemi Covid-19. *Ideas: Jurnal Pendidikan, Sosial, Dan Budaya*, *7*(3), 57. https://doi.org/10.32884/ideas.v7i3.408

Tucker, B. (2012). The flipped classroom. *Education Next*, *12*(1), 82–83.

Umam, K., Nusantara, T., Parta, I. N., Hidayanto, E., & Mulyono, H. (2019). An application of flipped classroom in mathematics teacher education programme. *International Journal of Interactive Mobile Technologies*, *13*(3), 68–80. https://doi.org/10.3991/ijim.v13i03.10207

Utami, S. (2017). *Pengaruh model pembelajaran flipped classroom tipe peer instruction flipped terhadap kemampuan pemecahan masalah matematik siswa*. Fakultas Ilmu Tarbiyah dan Keguruan.

Yang, L., Sun, T., & Liu, Y. (2017). A Bibliometric Investigation of Flipped Classroom Research during 2000-2015. *International Journal of Emerging Technologies in Learning*, *12*(6), 178–186. https://doi.org/10.3991/ijet.v12i06.7095