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A Critical Review of Enhancing Students Google Classroom Skills for Mathematics Subject

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Abstract

A critical review of literature was conducted to analyse the current body of knowledge on enhancing students' Google Classrooms skills. There are two primary approaches to review of literature: the topical and critical review approaches. This article discusses about the critical review that was conducted using a 5 steps method: (1) defining a research objective and research question, (2) observing particular sample of sources in the literature observed, (3) analysing the data that was collected from the sources after applying inclusion and exclusion criteria, (4) reporting the findings from critical analysis using descriptive statistics and lastly, (5) discussing implications from these results that were identified. The author was able to identify two themes from the critical review, which were then built into a conceptual framework based on their relationships. This review gives insight on the efficiency of using Google Classroom in education. Educators from all levels use Google Classroom as it is convenient, easily accessed and practical. However, the knowledge gaps identified in this critical review call for additional research in the field of improving students' Google Classroom skills especially for the primary school. This can help to lessen the burden of their parents and in the meantime, improve their technological skills and train them to be independent.

Keywords: Google Classroom, Education, Mathematics, Technology Readiness.

Introduction

The world is changing rapidly in the era of Industrial Revolution 4.0. People use technology in every aspect of their lives, from house chores to the work sector. Economy, social life, health and education sector had the most impact towards this new era. On top of that, COVID-19 pandemic outbreak during 2020 urges everyone to stay at home in order to lower the cases and it changes the life routine. The pandemic impacted the learning process as well, thus the education stakeholders have to come out with solutions to overcome this problem. From face-to-face classes, education is moving to the new phase of the online learning process to keep the connection between teachers and students, especially in delivering lecture materials and assessing learning objectives (Setiawan & Oka, 2020). The Department of Basic Education in South Africa closed down all schools during the lockdown phase and forced the educational practitioners to shift from face-to-face class to online learning, hence it brings to emergency remote teaching (ERT) (Chirinda et al., 2021). These global changes lead the learning process to make better use of technology (Maharani & Kartini, 2019). Hence, e-learning is applied and adjustments are made to ensure the learning process is sustained.

A research done by Naserly (2020) explores several digital platforms that support e-learning that are Zoom Meeting, Google Classroom and Whatsapp group with its own advantages. Maharani & Kartini (2019) found that Google Classroom is an effective platform to be used in the mathematics learning process, regarding planning the lesson, conducting the learning process and the assessment of the students in Indonesia. It helps the teachers to share files and documents, assess the students, give grades and feedback on students assignments. In order to remake its own digital learning platform and reinforce the e-learning platform, Malaysian Ministry of Education collaborated with Google, Microsoft and Apple to come out with DELIMA (Xiung, 2020). This platform is being widely used by the teachers and students as Malaysia accumulated the highest search for Google Classroom in April 2020 (Hairon, 2020).

Google Classroom is one such digital platform that is both free and simple to use in teaching and learning activities. It is great for keeping track of students' progress, as well as communication and engagement between teachers and students. Google Classroom is a free web-based application that allows anyone with a computer or smartphone to communicate without using paper. It was created specifically for educational institutions to help them create, distribute and mark assignments in a more user friendly manner. The major goal of Google Classroom is to allow teachers and students to share e-content and e-files in a systematic manner. An educationist or a teacher may make 'announcements' to the students in order to virtually share learning content. Almost every learning management system (LMS) is compatible with Google Classroom. As a result, it is free, easy to use and provides a structured platform for exchanging knowledge resources.

The crucial of using Google Classroom in education is aligned with the importance of implementing technology in education. Students must have understanding of a core subject as well as learning skills and vital 21st-century talents, such as information technology expertise, problem-solving skills, communication, and life skills. As a result, teachers in the 21st-century must tailor teaching and learning to suit learners' environments in light of rapid social and technological change. Thus, one of the tools used for teaching mathematics during the pandemic is Google Classroom. Mathematical process abilities should be the focus of

learning in three ways. To begin, it should be presented through the use of Google Classroom to decrease time consuming and redundant tasks in order to give students more time to fulfil their learning goals and apply what they have learned in their daily lives. Second, the learning design should give students the opportunity to use Google Classroom as a learning resource for studying and research, as well as to use data through reasonable analytical processes. Third, it is about using Google Classroom into the communication process, such as presenting data, delivering assignments, submitting homework, or establishing informal teaching channels outside of the classroom.

This article explores the discussion of using Google Classroom as a digital platform in education during the pandemic. This conclusion is drawn after conducting a careful examination of recent literature on the subject of this article. The phrasing of the problem is addressed first, in accordance with traditional research techniques, before a method of collecting and analysing data is described. The analysis' findings are subsequently given, along with their consequences.

A literature review summarises the present state of knowledge in a certain field. This is accomplished by segmenting the subject into distinct sections and addressing each issue in turn. The area of Google Classroom in education is greatly emphasized and prioritized in this document, and researchers must guarantee that their selected research topic is innovative and relevant to their field of study. Extracting material from articles, books, book chapters, and even reports is used to conduct literature reviews. Researchers have the option of keeping or rejecting each retrieved article while working on this phase of their study. Several points of view are considered when writing a critical review in this study. Researchers are given the opportunity to evaluate documents based on specific criteria that are relevant to their studies. A critical review is a thorough analysis and evaluation of a text by referring to the theme selected.

The purpose of doing this critical review is to determine the usefulness of using Google Classroom to boost students' interest and achievement in school, particularly in vital subjects like mathematics. The problem in this study is addressed by proposing the following research questions: if Google Classroom is such an excellent tool for delivering Mathematics classes during a pandemic, why are not more students participating? This question is divided into two main themes: Google Classroom as a convenient digital platform for students to continue learning and technology readiness in education. These two themes were used to organise the articles found for this critical review.

Methodology

It is crucial to conduct a thorough review of the literature in order to locate all existing studies relevant to the topic under consideration. To ensure that the retrieved articles were relevant to the domain of this study, a thorough and narrow search of all relevant articles was conducted before specifically selecting appropriate and affiliated articles that deal with the research question and themes of this study. The database used to find the relevant article is Scopus by using keywords related to the theme of Google Classroom, education, Mathematics and technology readiness. The keywords used were 'Google Classroom in education', 'Google Classroom for Mathematics education', 'Google Classroom readiness in education' and

'technology/online readiness in education. The results of the information search are presented in Table 1.

Table 1

The Total Articles Classified by the Database

Database	Keywords			
	Google Classroom in education	Google Classroom for Mathematics education	Google Classroom readiness in education	Technology/online readiness in education
SCOPUS	13	7	2	17
Total	39			

Based on Table 1, there are 39 articles related to the keywords used in the Scopus database. As a result, inclusion and exclusion criteria were used to find more relevant materials that were of high quality and fit the topic's theme, as well as to produce a suitable critical review. The first exclusion made is to ensure that the papers correspond to the most current 21st century learning environment, publications from 2017 and after were included, whereas writings before to 2017 were removed. Older articles may discuss outdated educational technology trends that are no longer relevant in today's world of learning.

Second, the peer-reviewed status of the articles obtained was ensured. These articles provide reliable research that is based on the knowledge of numerous experts in the field, which prevents faked work from being adopted within a field of study. This inclusion and exclusion criteria filter eliminates articles that do not meet the peer-reviewed requirement. Following that, the filter also filtered out all writings in the form of conference and book chapters.

Third, articles unrelated to Google Classroom and education were excluded from the selection. Articles that did not focus on education, using Google Classroom as a tool of learning and implementing technology in learning Mathematics were excluded. This filter helped to focus on using Google Classroom as a main tool in teaching primary school students during pandemic.

Forth and last exclusion were made on the research approaches used that comprises quantitative studies, qualitative studies and mixed-method studies. This assures that previous research has successfully investigated the topic under discussion using Google Classroom in education. These findings demonstrated that using all three research approaches was critical for obtaining a valid and solid data interpretation outcome in the field of education using Google Classroom as an online platform for Mathematics learning.

Results and Discussion

After the application of these four inclusion and exclusion criteria that is publication years ranging from 2017 and above, peer-reviewed articles, studies focusing on a wider use of

Google Classroom in education and using the three research design methodologies which are quantitative, qualitative and mixed-method research design methodology, a total number of eleven articles remained relevant to the theme of this study out of the thirty-two articles searched initially.

Table 2
Report of the Critical Analysis of Literature

Authors	Year	Journal	SC	GC	RD	MT	Country	Data Collection Methods
Farah Naz Makhdam, Afifa Khanam	2021	Journal of E-Learning and Knowledge Society	/	/	/		Pakistan	Questionnaires
Anastasia Gouseti	2021	Review of Education	/	/	/		England, Greece	Interview
Cuiying Zou, Ping Li, Li Jin	2021	PLOS ONE	/	/	/		Wuhan	Survey
Noor Rohana Mansor, Asyraf Hj Ab Rahman, Ahmad Tajuddin Azza J., Roswati Abd Rashid, Nurul Ain Chua	2021	Academic Journal of Interdisciplinary Studies	/	/	/		Malaysia	Questionnaires
R Amelia, G Kadarisma, N Fitriani, Y Ahmadi	2020	Journal of Physics: Conference Series	/	/		/	Indonesia	Questionnaires
R P Murtikusuma, Hobri, A Fatahillah, S Hussien, R R Prasetyo, M A Alfarisi	2019	Journal of Physics: Conference Series	/	/		/	Indonesia	Development research
Ketsaraporn Suanse, Chokchai Yuenyong	2019	Journal of Physics: Conference Series	/	/		/	Thailand	Development research
R Ramadhani, N S Bina, S F Sihotang, S D Narpila, M R Mazaly	2020	Journal of Physics: Conference Series	/	/		/	Indonesia	Pre-test, Post-test
Preeti Sharda, Maneesh Kumar Bajpai	2021	Journal of Library & Information Technology	/	/	/		India	Questionnaires
Maman, Hasan Baharun, Ramadhan Witarsa, Dewi Tumatul Ainin, Zafrul Hodaili, Mushorfan, Majid Afnani Wiranata	2021	Journal of Physics: Conference Series	/	/	/		Indonesia	Interviews Observation Documentation

Y D Permatasari, T Nurhidayati, M N Rofiq, A R Masrukhin	2021	IOP Conference Series: Earth and Environmental Science	/	/			Indonesia	Observation
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Note: *SC=Scopus* / *GC=Google Classroom* / *RD=Readiness* / *MT=Mathematics*

Referring to the articles chosen, Google Classroom is the most commonly used digital platform in every level of teaching. Either in primary school, secondary school or even universities. It is used widely across subjects and shows positive results and findings. Preeti Sharda and Maneesh Kumar Bajpai (2021) suggests that Google Classroom is an excellent teaching platform that provides an accessible medium for the exchange of knowledge in terms of ease of access, perceived usefulness, tracking students' progress, and communication and interaction between teachers and students, comparative performance is favourable. It is supported by Maman et al (2021) that agrees Google Classroom is used to maximise the process of distributing material to students, as well as online evaluations and assessments, so that the material can be transferred and the success of the material can be monitored. In the findings, lecturers find it simple to carry out their learning activities when they use Google Classroom and its assessment system.

Research by Permatasari et al (2021) also shows positive feedback by students on implying Google Classroom in their English classes. The students' perceptions of taking English classes with Google Classroom application: a) students said that using Google Classroom application was simple, b) students expressed high appreciation for the teaching and learning processes on Google Classroom Application, c) students showed great enthusiasm in completing assignments or submitting papers on Google Classroom Application, and d) those images indicated that students could complete assignments without difficulty.

Teaching Mathematics via Google Classroom has been conducted by numerous teachers and lecturers all over the world. Murtikusuma et al (2019) had a research on blended learning with Osing culture theme in Mathematics learning. The study agrees that based on the research findings: (1) Blended Learning assisted-Google Classroom in this research was categorised as valid based on the validator's assessment; (2) Blended Learning assisted-Google Classroom in this research is categorised as practical based on observations of teacher activities and advice from practitioners; and (3) Blended Learning assisted-Google Classroom in this research is categorised as effective based on a survey of practitioners.

It is followed by another research conducted in 2020 by Ramadhani about critical mathematical thinking abilities through flip-problem based learning models. The researcher suggests that it is possible to conclude, mathematics learning using Flip-Problem Based Learning based on LMS-Google Classroom has a significant impact on students' mathematical critical thinking abilities. Students gain new experiences in addition to mathematical critical thinking skills by participating in digital-based learning. Students also gain a better understanding of the importance of collaboration and joint investigation in solving complex mathematical problems. Students are also becoming more critical in their understanding of the problems presented and in truly preparing plans when carrying out the problem-solving process in order to draw conclusions.

Google Classroom analytic geometry online provided students with the opportunity to develop some knowledge and skills prior to participating in the classroom where teachers

assigned students to do problem solving about analytic geometry in a face-to-face setting. Students' evaluations on their mathematics learning could also be supplied through the Classwork menu. As a result, the development of the analytic geometry flipped classroom teaching model via Google Classroom provided an active learning environment (Suanse and Yuenyong, 2021). This research was conducted for Grade 10 students in Thailand.

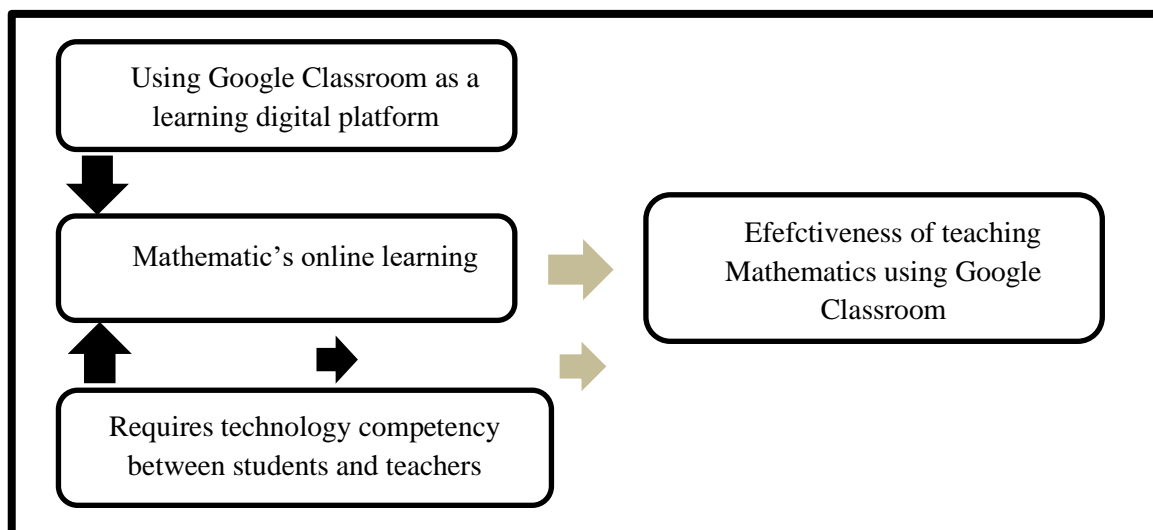
Despite the benefits of using Google Classroom as a digital platform for learning, teachers and students must improve their technological management skills. It is great to have Google Classroom as a digital platform, but it would not lead to any significant learning unless both sides understand how to use it. According to Amelia et al (2020), their research shows that junior high school student resilience was rated as high during this online learning period based on the results of data collected. The willingness and sincerity with which students participate in learning via Google Classroom and Zoom meetings demonstrates this. Even in difficult situations, students always respond positively, and they can learn from a variety of sources. The research was conducted in Indonesia.

A research conducted in Pakistan by Makhdam & Khanam in 2021 shows that technology competences, time management skills, efficient material delivery, and attitudes are all factors in students' and teachers' preparation. The results show that students had high (81.3%) and teachers had good (63.2%) technological skills in managing technical aspects of online sessions, indicating their technical preparedness for the online mode to determine if they were ready to switch schooling to a new system.

Students in college and university were also affected, and they continued their studies utilising a digital platform. As a result, Noor Rohana Mansor et al. conducted a research on university students in Terengganu, Malaysia to see if they were ready to take online lessons. The finding shows that the students were well-prepared to engage in online learning. It was based on their educational experience with computers and the information technology age generation known as the Net generation (Gen-Z). It assisted students in learning real-world skills in this new online learning standard. Just a few pupils were still reluctant and less confident in confronting this problem, due to a lack of experience with computers and gadgets and a poor degree of computer literacy.

Some data suggest that students' readiness to engage in online learning is poor and unsatisfactory. Teachers in England and Greece express their concern about pupils' participation in online learning. Because student involvement was lower in poorer schools during lockdown, the shift to online teaching and learning has been viewed as nearly certain to deepen the educational divide between children from different socioeconomic situations (Anastasia Gouseti, 2021). During the Covid-19 shutdown, parents were expected to play a larger role in their children's education than they had previously, and the younger the children, the more committed and supportive the parents had to be, whether financially or emotionally. Zou et al (2021) also indicates that both teachers and students in a college in Wuhan rated themselves as slightly less prepared for this emergency online migration. Individual differences exist among students from various areas and types of institutions, as well as those who use different terminal devices and internet connections. As a result, they were unprepared for online learning.

Figure 1 depicts a proposed framework for the process by which a Mathematics teacher could implement Google Classroom in online learning. Several articles selected show the benefits of using Google Classroom for online learning, so having it as a digital platform for Mathematics class is a good decision. It takes technology competency and skills from both teachers and students to make it a reality. When all of the criteria are met, the effectiveness of Google Classroom in the Mathematics class will be realised.



*Note: Integrated into teaching process | Results in

Figure 1. Proposed Conceptual Framework Showing the Process of Implementing Google Classroom in Mathematics class

Conclusion

The development of a critical review in this study of using Google Classroom in Mathematics online learning resulted in two implications. The study agreements are the first implication, and the study gaps are the second. The articles reviewed in this paper all agree that using Google Classroom makes teachers' and students' jobs easier and more convenient. It implies that technological skills are required for a more efficient online learning process. The research gap revealed by this study can be seen in the scarcity of studies focusing on junior primary schools' abilities to implement Google Classroom as their online learning platform. If these students did not master the technology skills well, they may have dropped out during the online learning. They also rely on their parents and siblings to attend their online classes. Further research is required, particularly in enhancing the skills of using Google Classroom by primary school students.

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