Journal of Didactic Mathematics
2022, 3(2), 69-77
Doi: 10.34007/jdm.v3i2.1461
https://mahesainstitute.web.id/ojs2/index.php/jdm
journalofdidacticmathematics@gmail.com

Comparative study of online learning and hybrid learning based on students' habits of mind after COVID-19 pandemic

Aditya Prihandhika*
Universitas Pendidikan Indonesia, Bandung, West Java, Indonesia, 40154
Universitas Islam Al-Ihya Kuningan, Kuningan, West Java, Indonesia, 45552

Didi Suryadi
Universitas Pendidikan Indonesia, Bandung, West Java, Indonesia, 40154

Sufyani Prabawanto
Universitas Pendidikan Indonesia, Bandung, West Java, Indonesia, 40154

**Corresponding Author*: adityaprihandhika@upi.edu

Abstract. The purpose of this study was to evaluate mathematics learning through online learning and hybrid learning which were reviewed based on the Habits of Mind (HoM) owned by 70 samples as the prospective mathematics teachers from a university in West Java, Indonesia. The research data was obtained from a questionnaire containing 26 statements referring to the HoM indicators. It was measured using a Likert scale and then analysed using the Mann Whitney-U test to see if there were differences in the achievement of HoM from the two sample groups that received the online learning and the hybrid learning method. The results showed that there was no difference in the achievement of HoM in the two groups with the average score still below the ideal score of each measured indicator. Based on these findings, the implementation of online learning and hybrid learning methods pay more attention to affective abilities so that the achievement of prospective mathematics teachers' HoM in mathematics learning after the COVID-19 pandemic can be maximized.

Article History:
Received: August 15, 2022
Revised: September 5, 2022
Accepted: October 1, 2022

Keywords:
Habits of mind; online learning; hybrid learning; COVID-19

Citation: Prihandhika, A., Suryadi, D., & Prabawanto, S. (2022). Comparative study of online learning and hybrid learning based on students' habits of mind after COVID-19 pandemic. *Journal of Didactic Mathematics*, *3*(2), 69-77. Doi: 10.34007/jdm.v3i2.1461

INTRODUCTION

The effectiveness of individuals or groups in the learning process is not only fully determined by their cognitive abilities, but is also determined by how well the individual or group utilizes affective abilities such as attitudes, interests, and emotions of students to provide an assessment of something. in the process of obtaining information during learning (Louis & Sutton, 1991). Farida, et al. (2019) through their research concluded that there is a positive relationship between attitudes and mathematics achievement. In addition, the results of research by Mark, et al. (2010) concluded that the attitudes and character of students affect the ability to capture the given learning material. In addition, the importance of affective abilities is stated in NCTM (2000) which directs students to learn about the value of mathematics, be confident in doing mathematics, become mathematical problem solvers, and learn to communicate mathematically. Some of these opinions indicate that in learning mathematics, affective ability is an important aspect to consider in shaping students' character so as to support mathematical thinking skills.

Habits of Mind (HoM) is one of the affective abilities to behave intellectually or intelligently when facing problems which is identified into sixteen characteristics, namely (i) perseverance or never giving up; (ii) regulate conscience; (iii) listen to the opinions of others with empathy; (iv)

flexible thinking; (v) metacognitive thinking; (vi) strive to work carefully and precisely; (vii) inquire and raise issues effectively; (viii) utilize old experiences to form new knowledge; ix) think and communicate clearly and precisely; x) utilize the senses in collecting and processing data; xi) creating, imagining, and innovating; xii) enthusiastic in responding; xiii) dare to take responsibility and take risks; xiv) funny; xv) interdependent thinking; xvi) and continuous learning (Costa & Kallick, 2008; Cuoco, et al., 1996; Adams, 2006; Goldenberg, 1996). HoM is a behavioral tendency that a person has to solve the problems at hand (Campbell, 2006; Alhamlan, et al., 2018).

Marzano (1992) stated HoM is included in the learning dimension, namely: 1) attitudes and perceptions; 2) acquisition and integration of knowledge; 3) develop or refine knowledge; 4) use knowledge meaningfully; 5) habits of mind. The learning dimension is a comprehensive instructional framework to assist in planning the learning experiences that will be presented to their students. The five learning dimensions are interrelated with each other and form a framework that can be used to improve the quality of learning. According to Costa and Kallick (2009) there are four levels in education, namely: 1) The first level, namely material, relates to mastery of certain content or concepts of a subject lesson; 2) The second level is thinking skills, in the learning process students are trained in their thinking skills by asking students to work on a teaching material by analyzing or making conclusions so that by training students' thinking skills, students will have certain thinking skills; 3) The third level is mastering cognitive tasks that require skilled thinking and training students to do deep thinking; 4) The fourth level is habits of mind or habits of mind that help students to achieve success. The levels of educational outcomes are depicted in Figure 1.

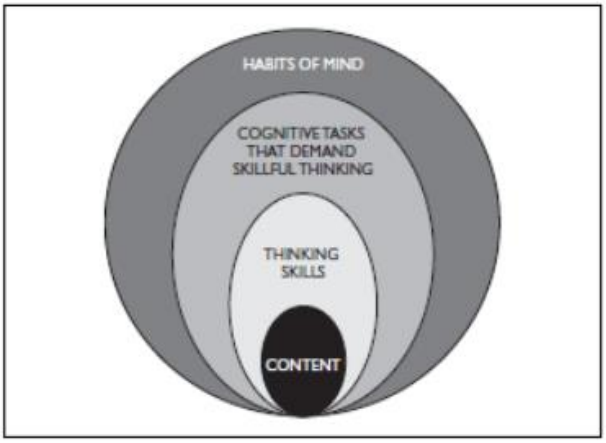

Figure 1. Four levels in education

Based on the graph, it is shown that habits of mind are the highest level of educational outcomes, which are formed gradually and not only through one or two lessons but through a long process of learning experienced by these students. The habits are like a rope knitted from a thread day by day so that we cannot break it (Alhamlan, et al., 2018). HoM implies that behavior requires a disciplined mind that is trained in such a way that it becomes a habit to keep trying to take wiser and smarter actions. This can be understood because all forms of action taken by an individual is a consequence of his habits of mind. When faced with problems, students tend to form certain intellectual behavior patterns that can encourage individual success in solving these problems. Therefore, the habits of mind that a person has will affect his success, one of which is his success in learning mathematics at school (Costa & Kallick, 2008).

HoM have two important characteristics, such as the characteristic of thinking and the characteristic of getting used to. In addition, the habits of mind associated with practice reflection in the classroom. Mathematicians, educators, and other experts have tried to describe mathematical thinking, often using terms such as mathematical thinking habits, mathematical processes, or mathematical practice (Adams, 2006). Students who only learn math facts, definitions, rules, and

procedures can solve math problems with relative ease. But many of those same students later find that they can't use what they know when they encounter real problems or situations. Habits of mind in general include recognizing patterns, experimenting, formulating, experimenting, creating, visualizing, and guessing. HoM in mathematics learning includes learning concepts with related examples, generalizing, abstraction, thinking in terms of functions, using multiple points of view, conducting experiments (Cuoco, et al., 1996). Another opinion states that habits of mind are the characteristics of what intelligent people do when they are faced with problems, the solutions of which are not immediately imaginable (Campbell, 2006). Habits of minds are a collection of problem-solving abilities, skills related to everyday life, needed effectively for social life and support reasoning, sensitivity, perseverance, creativity and expertise. The understanding and application of the sixteen habits of thought serves to give individuals the skills to work through real-life situations that equip people to respond using mindfulness, thought, and deliberate strategies to obtain positive results. Habits of mind are also considered as cognitive dispositions a mental tendency to act, in a certain way in response to a situation. However, some research results show that the learning process still emphasizes the cognitive aspect and pays less attention to the affective aspect regarding the formation of students' attitudes or character (Dwirahayu., et al., 2017; Goldenberg, et al., 2010; Mark, et al., 2010). This statement is reinforced by the low achievement of HoM on several indicators indicated by the tendency of students to give up, not listening with understanding and empathy, still shy to ask questions and pose problems, and are less able to apply past knowledge in solving problems (Mark, et al., 2010; Gordon, 2011; Dwirahayu., et al., 2017; Goldenberg, et al., 2010; Altan, et al., 2019; Pei, et al., 2018; Farida, et al., 2019). Thus, it is necessary to pay special attention to affective abilities, especially HoM in the mathematics learning process. Nizam (2015) stated that one of the factors that causes the achievement of mathematical abilities to be not maximal is affective factors or internal factors of students. More specifically, the factor in question is students' confidence in mathematics which shows that only 23% of students are confident in their mathematical abilities. This percentage is relatively lower compared to other countries. This shows that the affective abilities possessed by students also have a big role in learning success.

With regard to the mathematics learning process, implementation during the COVID-19 pandemic was considered very ineffective because it was still carried out by presenting material, providing sample questions, asking students to do exercises in textbooks, then discussing them with students. Therefore, several models are needed to build students' understanding after learning transformation due to the COVID-19 pandemic (Mulenga, et al., 2020; Moore, et al., 2011; Singh & Thurman, 2019). Learning models that are widely used today include online learning and hybrid learning (Ilmadi, et al., 2020; Curtis & Lawson, 2001; Tsitsia & Kabbah, 2020; Giberti, et al., 2022; Hwang, 2018; Lin, 2008). Online learning is independent, flexible, and there is no physical contact between students and teachers because all learning activities are carried out virtually using the internet network (Mulenga & Marbán, 2020). Some of the benefits obtained when using online learning include: 1) learning is more flexible and comfortable so that learning motivation is better; 2) student performance can be monitored more easily; 3) online learning can be used as a learning resource and media; 4) fun learning (Ilmadi, et al., 2020). Furthermore, Curtis and Lawson (2001) stated that being able to make students get new experiences in learning to use technology so as to enable increased creativity and critical thinking. Some research results show that online learning can improve student learning outcomes (Irwan, et al., 2019). In addition, online learning can also increase student learning motivation (Amin, 2017). As the same time, hybrid learning is a combination of online and offline web-based learning with reference to all models incorporated with technology, including e-mail, streaming media, and traditional teaching (Lin, 2008). Hybrid learning by experts is considered capable of bridging the demands of the progress of information systems that are growing very rapidly and the demands to maintain noble values or the character of the nation (Lin, 2008). In some studies, the hybrid learning model can increase students' understanding with a note that the learning tools have been prepared properly by the teacher

(Hwang, 2018). Given the importance of affective abilities and the transformation of learning models after COVID-19 as stated, we consider it necessary to conduct research with the aim of assessing whether there are differences in the effectiveness of online learning and hybrid learning on HoM and investigating HoM indicators that appear in prospective mathematics teachers.

METHOD

The study uses a quantitative method with a quasi-experimental design conducted in March – May 2022 at one of the universities in West Java, Indonesia. Data collection was determined by purposive sampling technique on 70 prospective mathematics teacher students who were divided into two sample groups. As many as 35 samples were included in the samples group who received an online model where the learning treatment was fully connected using the internet network and followed from various places at the same time. In the other group, as many as 35 samples received hybrid model treatment, namely learning that combines online model and offline model.

The research data was obtained from the results of the pretest before and posttest based on a questionnaire which was measured using a Likert scale with interval 1 (strongly disagree), 2 (disagree), 3 (agree) and 4 (strongly agree). The questionnaire consists of 26 valid and reliable statements based on the HoM indicator with reference to mathematics learning, including: 1) I try to keep understanding the concept mathematics being studied though the material is difficult; 2) I feel that I have no talent in learning mathematics even though I already have study hard; 3) I can't study math well when I'm experiencing problem; 4) I am motivated to study harder when I can't do math problems well; 5) I have less concern for friends who have difficulty in study mathematics; 6) I like solving math problems in a variety of ways; 7) I do not want to change my understanding of a mathematical concept even though my understanding is wrong; 8) I do not know well what I have and have not mastered when studying mathematics; 9) I am able to apply the right strategy so that I can master mathematical concepts well; 10) I always double check the results solving mathematical problems that have been I work; 11) I look for solutions to difficult math problems by asking the teacher or other friends; 12) If given a math problem, then I cannot determine what is known and asked in the matter; 13) I find it difficult to use learned mathematical concepts to learn new mathematical concepts; 14) I can learn mathematics well if I have mastered the initial concepts in the material; 15) I am able to explain mathematical concepts that I have understood in a language that is easily understood by friends, both orally and in writing; 16) I find it difficult to express what I think about mathematical concepts to friends, both orally and in writing; 17) I actively write math material based on what I see and hear from the teacher's explanation, and actively practice what the teacher asks for in learning; 18) I feel challenged to discover new things in mathematics, especially in the application of concepts in life; 19) I am less interested in thinking about the use of mathematics in everyday life; 20) I always actively participate in every mathematics learning process that is carried out together; 21) I feel lazy when asked by the teacher to present the results of individual or group work in learning mathematics; 22) I keep being honest in math tests even though there are questions that I can't do; 24) I feel entertained when the teacher or other friends occasionally make humor when learning mathematics is taking place; 25) I believe that working together in groups in learning mathematics will be more effective than individually; 26) After finishing studying one of the mathematics materials, I am interested in learning new mathematics material. Furthermore, the data obtained were analyzed using the Mann Whitney-U test to determine the difference in the achievement of HoM between prospective mathematics teachers who received online learning and hybrid learning.

RESULTS AND DISCUSSION

Description of the average score of the measurement scale on the HoM of two samples group is presented in Table 1.

Table 1. Description on habits of mind score

Group	Numbers of Samples	Score
Online Learning	35	71,09
Hybrid Learning	35	72,77
Ideal Score	114	

The average score of the HoM indicators in the online learning group and the hybrid learning group with a mean score difference of 1.68. From the descriptive analysis, the average scores of HoM in the hybrid learning group were greater than that of online learning, although the average score of the for both classes was still far from the ideal score of 114. The results of the HoM score showed in Figure 2.

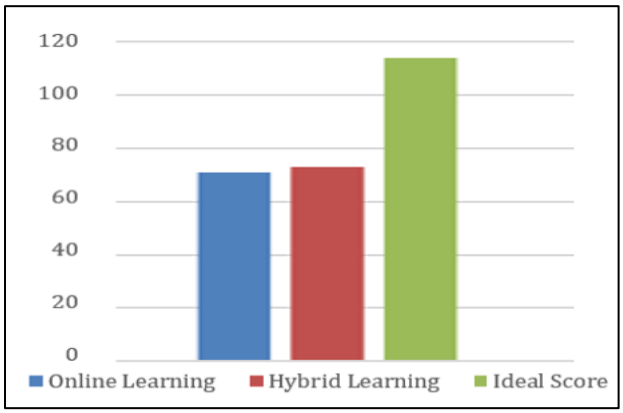

Figure 2. The habits of mind score

Furthermore, inferential analysis of data from two independent groups was carried out obtained from the posttest in the form of a Likert scale questionnaire that measured students' perceptions of their thinking habits based on sixteen HoM indicators with answer options Strongly Agree (SA), Agree (A), Disagree (D), and Strongly Disagree (SD). The following is a descriptive statistic on the percentage of HoM scale obtained from the questionnaire data in Table 2.

Table 2. Percentage habits of mind

Group	Habits of Mind			
	N	Xmin	Xmax	Percentage
Online Learning	35	47	80	55
Hybrid Learning	35	43	79	56
Maximum Percentage			100	

It is known that the average percentage scale the perception of the HoM in the hybrid learning group that is equal to 56% with the largest score percentage is 79% and the smallest score percentage is 43%. Meanwhile, in the online learning group, it is 55% with the largest score percentage is 47% and the smallest score percentage is 80%. If it is seen from the average percentage of the HoM scale of the two experimental classes, the average acquisition of the HoM scale of students in the hybrid learning group is better than students in the online learning group with a difference of 1%. The percentage of the HoM showed in Figure 3.

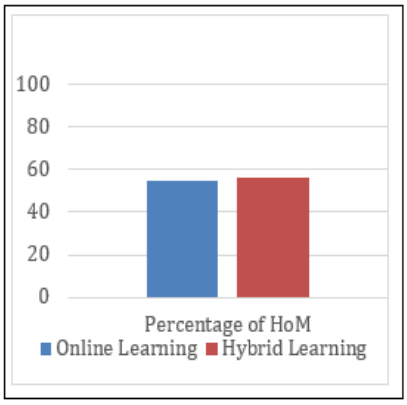

Figure 3. The percentage of habits of mind

The regard to hypothesis testing, the hypothesis used is that there is a difference in the achievement of HoM between the sample who received hybrid learning and the sample who received online learning in terms of the whole. The statistical test used the Mann Whitney-U test for the data obtained from the questionnaire. The results of analyses data are shown in Table 3.

Table 3. The Results of Mann Whitney-U Test

Mann Whitney-U	N	Sig. (p-value)	Decision	Description
526	70	0,309	H_0 accapted	There is no difference

Referring to the statistical test results, sig. (p-value) is obtained of 0.309 > 0.05. Based on the test criteria, it can be concluded that H_0 is accepted. This means that there is no significant difference in the achievement of HoM between the samples who received online learning and the samples who received hybrid learning based on the questionnaire. This section discusses the formulation of the problem, namely whether there are differences in HoM between students who receive hybrid learning and students who receive online learning. The research hypothesis from the formulation of this problem is that there are differences in HoM between students who receive hybrid learning and students who receive online learning. Referring to the results of hypothesis testing with data analysis using the Mann Whitney-u test, the results of data analysis were not in line with the research hypothesis proposed in the study. The results of the analysis show that there is no difference in the achievement of HoM between students who receive online learning and hybrid learning. These results illustrate that online learning and hybrid learning are considered less able to develop the HoM with the consideration that the learning time carried out for six meetings is still considered insufficient (Farida, et al., 2019). The formation of the affective domain as a result of learning is relatively slower than the formation of the cognitive and psychomotor domains, because the affective domain is the result of the formation of the cognitive and psychomotor domains (Louis & Sutton, 1991; Costa & Kallick, 2008; Cuoco, et al., 1996). The affective domain is a physical object that is indirect, different from the cognitive and psychomotor domains that can be owned by students after teaching and learning activities take place (Cuoco, et al., 1996). The following is the average HoM score based on the questionnaire in Table 4.

The average HoM scores of students in the online model and hybrid model, the average HoM scores of students in both groups have not yet reached the ideal score. Only a few indicators are close to the ideal score set, namely on indicators utilizing old knowledge, being humorous, and feeling mutual need. These findings indicate that feeling mutual need, utilizing old knowledge, and being humorous are aspects that are inherent in students in the learning process. The collaboration between students in small groups is needed by students to be able to solve problems that are considered difficult (Singh & Thurman, 2019). In addition, the learning is not only receiving new knowledge, but also the process of rearranging old knowledge to accommodate new knowledge (Alhamlan, et al., 2018).

Table 4. Percentage habits of mind

No	Indicator	Online Learning	Hybrid Learning	Ideal Score
1	Continuous learning	2,90	2,94	4
2	Ask and respond effectively	2,83	3,06	5
3	Regulate conscience and think reflectively	2,19	2,33	4
4	Take advantage of old experience	3,06	3,24	4
5	Humorous	3,20	2,71	4
6	Creating, imagining, and innovating.	3,19	3,22	6
7	Eager to respond	3,90	3,90	5
8	Never give up	2,63	2,61	4
9	Work accurately and carefully	2,46	2,34	4
10	Think flexible	3,02	3,19	5
11	Utilize all senses	3,60	3,71	5
12	Responsible in dealing with risk	2,60	3,14	4
13	Have empathy	2,94	2,97	4
14	Metacognitive thinking	3,24	3,26	6
15	Feel the need for each other	2,51	2,46	3
16	Think and communicate clearly	2,61	2,67	5

The character building of students requires example, guidance, patience, habituation, and repetition (Cuoco, et al., 2010; Mark, et al., 2010; Gordon, 2011). The process of forming HoM is also a process of formation experienced by students as a form of personal experience through the values contained in fun learning (Bülbül, 2021; Mulenga, et al., 2020; Moore, et al., 2011). The HoM of samples are formed and developed through the learning process and habits are not something that is taught as mathematics material (Louis & Sutton, 1991; Costa & Kallick, 2008; Cuoco, et al., 1996). However, a habit is a value that is instilled or accustomed and its implementation continues (Goldenberg, 1996). The character in the individual is a value that cannot be present shortly after learning ends which develops in an individual can appear with several conditions (Adams, 2006). First, the individual must understand correctly how the habit forms. Both individuals must carry out a continuous process of habituation, the example shown by the teacher as well as direct learning integrated with their mathematical abilities.

CONCLUSIONS

Based on the results of data analysis, it was found that there was no difference between the sample group receiving online learning and the sample group receiving hybrid learning based on the overall questionnaire. Judging from the average HoM score, both groups were still below the ideal score. Thus, it can be said that online learning and hybrid learning are less able to improve students, so special attention is needed regarding affective abilities in post-COVID-19 learning which is dominated by virtual learning. In addition, the short treatment in this study became a limitation in efforts to improve HoM efforts as an ability that plays a role in student behavior in learning mathematics. Therefore, in future research it is recommended that other researchers pay attention to the number of meetings given to implement online learning and hybrid learning as models that are widely used in the current learning process.

REFERENCES

Adams, C. (2006). PowerPoint, habits of mind, and classroom culture. *Journal of Curriculum Studies*, *38*(4), 389-411. https://doi.org/10.1080/00220270600579141

Alhamlan, S., Aljasser, H., Almajed, A., Almansour, H., & Alahmad, N. (2018). A systematic review: Using habits of mind to improve student's thinking in class. *Higher Education Studies*, *8*(1), 25-35. https://doi.org/10.5539/hes.v8n1p25

Altan, S., Lane, J. F., & Dottin, E. (2019). Using habits of mind, intelligent behaviors, and educational theories to create a conceptual framework for developing effective teaching dispositions. *Journal of Teacher Education*, *70*(2), 169-183. https://doi.org/10.1177/0022487117736024

Amin, A. K. (2017). Kajian konseptual model pembelajaran blended learning berbasis web untuk meningkatkan hasil belajar dan motivasi belajar. *Jurnal Pendidikan Edutama*, *4*(2), 51-64. http://dx.doi.org/10.30734/jpe.v4i2.55

Bülbül, B. Ö. (2021). Factors affecting prospective mathematics teachers' beliefs about geometric habits of mind. *Journal of Pedagogical Research*, *5*(2), 36-48. https://doi.org/10.33902/JPR.2021068370

Campbell, J. (2006). *Theorising habits of mind as a frame- work for learning*. Paper presented at Australian Association for Research in Education, Adelaide.

Costa, A. L., & Kallick, B. (2008). *Learning and leading with habits of mind: 16 essential characteristics for success*. Alexandria, VA: ASCD.

Costa, A.L., & Kallick, B. (2009). *Habits of mind across the curriculum: Practical and creative strategies for teachers*. Alexandria, VA: ASCD.

Cuoco, A., Goldenberg, E. P., & Mark, J. (1996). Habits of mind: An organizing principle for mathematics curricula. *The Journal of Mathematical Behavior*, *15*(4), 375-402. https://doi.org/10.1016/S0732-3123(96)90023-1

Cuoco, A., Goldenberg, E. P., & Mark, J. (2010). Contemporary curriculum issues: Organizing a curriculum around mathematical habits of mind. *Mathematics Teacher*, *103*(9), 682-688.

Curtis, D. D., & Lawson, M. J. (2001). Exploring collaborative online learning. *Journal of Asynchronous learning networks*, *5*(1), 21-34. http://dx.doi.org/10.24059/olj.v5i1.1885

Dwirahayu, G., Kustiawati, D., & Bidari, I. (2017). Corresponding habits of mind and mathematical ability. *Journal of Physics: Conference Series*, *895*(1), 012013. http://dx.doi.org/10.1088/1742-6596/895/1/012013

Farida, F., Hartatiana, H., & Joemsittiprasert, W. (2019). The use of realistic mathematics education (RME) in improving mathematical analogical ability and habits of mind. *Al-Jabar: Jurnal Pendidikan Matematika*, *10*(2), 175-186. https://doi.org/10.24042/ajpm.v10i2.3540

Giberti, C., Arzarello, F., Bolondi, G., & Demo, H. (2022). Exploring students' mathematical discussions in a multi-level hybrid learning environment. *ZDM Mathematics Education*, *54*, 403–418. https://doi.org/10.1007/s11858-022-01364-4

Goldenberg, E. P. (1996). Habits of mind as an organizer for the curriculum. *Journal of Education*, *178*(1), 13-34. https://doi.org/10.1177/002205749617800102

Goldenberg, E. P., Mark, J., & Cuoco, A. (2010). Contemporary curriculum issues: An algebraic-habits-of-mind perspective on elementary school. *Teaching Children Mathematics*, *16*(9), 548-556. https://doi.org/10.5951/TCM.16.9.0548

Gordon, M. (2011). Mathematical habits of mind: Promoting students' thoughtful considerations. *Journal of Curriculum Studies*, *43*(4), 457-469. https://doi.org/10.1080/00220272.2011.578664

Hwang, A. (2018). Online and hybrid learning. *Journal of Management Education*, *42*(4), 557-563. https://doi.org/10.1177/1052562918777550

Ilmadi, I., Zarista, R. H., Aden, A., & Sastro, G. (2020). The effectiveness of online learning for mathematics students during the COVID-19 pandemic. *Jurnal Cendekia: Jurnal Pendidikan Matematika*, *4*(2), 1273-1282. https://doi.org/10.31004/cendekia.v4i2.372

Irwan, I., Luthfi, Z. F., & Waldi, A. (2019). Efektifitas penggunaan Kahoot! untuk meningkatkan hasil belajar siswa. *Pedagogia: Jurnal Pendidikan*, *8*(1), 95-104. https://doi.org/10.21070/pedagogia.v8i1.1866

Lin, O. (2008). Student views of hybrid learning: A one-year exploratory study. *Journal of Computing in Teacher Education*, *25*(2), 57-66. https://doi.org/10.1080/10402454.2008.10784610

Louis, M. R., & Sutton, R. I. (1991). Switching cognitive gears: From habits of mind to active thinking. *Human Relations*, *44*(1), 55-76. https://doi.org/10.1177/001872679104400104

Mark, J., Cuoco, A., Goldenberg, E. P., & Sword, S. (2010). Contemporary curriculum issues: Developing mathematical habits of mind. *Mathematics Teaching in the Middle School*, *15*(9), 505-509.

Marzano, R. J., Pickering, D., Arredondo, D. E., Blackburn, G. J., Brandt, R. S., & Moffett, C. A. (1992). *Dimensions of learning*. Alexandria, VA: Association for Supervision and Curriculum Development.

Moore, J. L., Dickson-Deane, C., & Galyen, K. (2011). E-learning, online learning, and distance learning environments: Are they the same?. *The Internet and higher education*, *14*(2), 129-135. https://doi.org/10.1016/j.iheduc.2010.10.001

Mulenga, E. M., & Marbán, J. M. (2020). Prospective teachers' online learning mathematics activities in the age of COVID-19: A cluster analysis approach. *Eurasia Journal of Mathematics, Science and Technology Education*, *16*(9), em1872. https://doi.org/10.29333/ejmste/8345

Nizam. (2015). *Ringkasan Hasil-hasil Asesmen Belajar dari Hasil UN, PISA, TIMSS, INAP*. http://puspendik.kemdikbud.go.id

Pei, C., Weintrop, D., & Wilensky, U. (2018). Cultivating computational thinking practices and mathematical habits of mind in lattice land. *Mathematical Thinking and Learning*, *20*(1), 75-89. https://doi.org/10.1080/10986065.2018.1403543

Singh, V., & Thurman, A. (2019). How many ways can we define online learning? A systematic literature review of definitions of online learning. *American Journal of Distance Education*, *33*(4), 289-306. https://doi.org/10.1080/08923647.2019.1663082

Tsitsia, B. Y., & Kabbah, S. K. (2020). Trainee-teachers' perceptions on traditional, online and hybrid learning modes of mathematics education in Ghana. *African Journal of Education and Practice*, *6*(7), 87-100. https://doi.org/10.47604/ajep.1185