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Evaluation of Polysynchronous Learning of Statistical Materials in High School

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ABSTRAK

Evaluasi pelaksanaan pembelajaran merupakan hal yang sangat penting. Penekanannya sebagian besar pada pembelajaran polisinkron. Tujuan penelitian ini adalah untuk menilai pembelajaran polisinkron pada materi statistika di SMA. Jenis dan pendekatan penelitian ini adalah deskriptif-kuantitatif. Subyek penelitian adalah 29 siswa SMA. Observasi, tes, dan angket digunakan untuk mengumpulkan data tentang pelaksanaan pembelajaran polisinkron, kemampuan pemecahan masalah, dan kemandirian belajar siswa. Analisis data dilakukan dalam tiga tahap: skoring, menghitung persentase, dan menghasilkan kesimpulan berdasarkan kategori yang disediakan. Hasilnya menunjukkan bahwa pembelajaran polisinkron dapat diimplementasikan dengan baik menggunakan Whatsapp untuk asinkron dan Google Meet untuk sinkron. Siswa dengan kemampuan pemecahan masalah sangat tinggi, tinggi, sedang, dan rendah masing-masing diwakili oleh 11, 7, 5, dan 6 siswa. Jumlah siswa dengan kemandirian belajar berkisar dari sangat tinggi, tinggi, hingga sedang, dengan masing-masing kategori sebanyak 6, 19, dan 4 siswa. Siswa memiliki kemampuan memecahkan masalah matematika dan kemandirian belajar kategori tingkat tinggi, yang memungkinkan pelaksanaan pembelajaran polisinkron materi statistik dapat dilaksanakan dengan tepat. Temuan penelitian ini menunjukkan bahwa pendidik dapat menggunakan pembelajaran polisinkron untuk meningkatkan kemampuan pemecahan masalah dan kemampuan belajar mandiri siswa mereka, terlepas dari apakah mereka tinggal di lingkungan pandemi atau normal baru.

ABSTRACT

Evaluation of learning implementation is critical. The emphasis is mostly on polysynchronous learning. The purpose of this study is to assess polysynchronous learning of statistical material in high school. The type and approache of this study is descriptive-quantitative. The subjects of the study were 29 high school students. Observation, tests, and questionnaires were used to collect data on the implementation of polysynchronous learning, problem-solving ability, and student learning independence. Data analysis is performed in three stages: scoring, computing percentages, and generating conclusions based on the provided categories. The results demonstrated that polysynchronous learning can be implemented properly utilizing Whatsapp for asynchronous and Google Meet for synchronous. Pupils with very high, high, medium, and low problem-solving talents are represented by 11, 7, 5, and 6 students, respectively. The number of pupils with learning independence ranges from very high to high to medium, with as many as 6, 19, and 4 students in each category. Students have the ability to solve mathematical problems and the independence to learn high-level categories, which makes it possible for the implementation of polysynchronous learning of statistical material to be carried out in an appropriate manner. The findings of this study suggest that educators can make use of polysynchronous learning to enhance the problem-solving abilities and independent learning capabilities of their pupils, regardless of whether they are living in a pandemic or new-normal environment.

1. INTRODUCTION

Assessment is an activity that is integrated with learning (Laksana & Dasna, 2017; Nuriyah, 2014; Syaifuddin, 2020). So far, assessment has focused more on assessing student competence, and less emphasis on process assessment (Dharmadi, 2012; Nisrokha, 2018; Syaifuddin, 2022). One of the important aspects of learning in the Covid era is assessing the success of learning both from the learning process and student competence (Setyowati & Hastuti, 2021; Sutiarso et al., 2022). The pandemic caused by the Covid-19 virus, which is still active today, has had a significant effect on a variety of Indonesian industries. The rapid transmission of the coronavirus from person to person led to the rapid rise of the covid-19 infection to the level of a pandemic. Since the beginning of COVID-19, there has been a significant increase in the number of cases entering Indonesia. The policies that have been issued and put into effect by the Indonesian

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government to combat the spread of the Corona virus include an appeal for people to remain inside their homes and the enforcement of social distancing, physical distancing, and the PSBB (Large-Scale Social Restrictions). The field of education is also subject to the implementation of a number of revised policies as a result of the pandemic caused by the Covid-19 virus (Siahaan, 2020; Yuliati & Saputra, 2020). The problem that arises, which is the government's policy of prohibiting face-to-face learning in person, can be circumvented through the use of online learning or distance learning as a solution (H, 2020; Herliandry et al., 2020; Siahaan, 2020). Obviously, this presents a fresh obstacle for the entirety of the educational system.

It is not simple to acquire knowledge in the midst of a pandemic. Learning through online platforms is one way to intervene in the transmission of COVID-19. Students who might not be able to attend in person can still receive an education through the use of online learning platforms (Motycka et al., 2013; Saputri & Pradana, 2021). The efficiency of learning can be improved by making better use of appropriate learning methods, which can be done while engaging in online learning. According to the viewpoint presented by previous study states that if the learning method that is being utilized is not appropriate, it will cause students to be unable to receive the information that is being presented by the teacher in an optimal manner, which will then cause students to become saturated, which will cause students to become passive in the process of learning (Niasri et al., 2019). According to the findings of other research, there are still many educators who rely solely on e-mail, Whatsapp, or SMS facilities. This will undoubtedly make the process of online learning more difficult, and it will also make learning less effective (Hamid et al., 2020). Other studies have shown that one of the challenges associated with online learning is a lack of utilization of available online platforms. This challenge is in addition to the inappropriate selection of learning methods and media, which has been shown to be a barrier (Misra & Mazelfi, 2021; Race, 2020). According to the findings appears that distance learning is still restricted to listening and has not yet focused on the skills necessary to put it into practice (Rayuwati, 2020).

Polysynchronous learning is a method of meeting students with other students, students with the learning process, and interaction between students and teachers through a combination of asynchronous online communication and synchronous online communication. Polysynchronous learning can also be thought of as a means of meeting students with teachers (Dalgarno, 2011; J. W. Kusuma & Hamidah, 2020) According to previous study polysynchronous learning is a form of dialogue that is carried out through the use of technical functionality (Oztok et al., 2014). This functionality allows for learning to flow fluidly and simultaneously between asynchronous and synchronous modes, depending on the needs of the learner. Learning that requires participation from both the teacher and the student is said to take place in a synchronous fashion. Learning that is synchronous and are not the same thing in terms of interaction, and they require different kinds of support (Kuo et al., 2014; Palupi, 2022).

Students' skills are developed and evaluated through the solving of problems as part of the educational process. Therefore, the ability to solve problems is extremely important for everyone, but especially for students. Students can demonstrate their ability to solve problems by demonstrating that they can process the information presented in a scenario to determine the actions that need to be taken (Mulyati, 2016; Yuliana & Taufiq, 2019). The ability to solve problems, particularly mathematical problems, is a fundamental skill that must be possessed by all students participating in the learning process. According to previous study problem-solving ability that students need to have at the time of learning is the ability of students to understand problems, the ability of students to design appropriate mathematical models, the ability of students to complete the models that have been designed, and the ability of students to interpret the solutions that have been obtained (Sumartini, 2016). All of these abilities are necessary for students to be successful in their learning.

Students are expected to have a conceptual understanding of how to solve problems as well as the ability to apply this knowledge (Herayanti et al., 2020; Mulyati, 2016). Previous study goes on to say that despite the fact that students are capable of problem-solving, it is patently obvious that their fundamental concepts are not nearly developed enough (Herayanti et al., 2020). The vast majority of students believe that mathematical problems are inherently difficult (Kholil & Safianti, 2019; Vanbinst et al., 2020). This is due to the fact that in order for students to successfully solve mathematical problems, they are required to relate previously acquired concepts (Hobri et al., 2020; Kholil & Safianti, 2019). The role of the teacher is an important one, and teachers need to be able to guide students toward the ability to think critically and creatively on their own (Hobri et al., 2020; Özreçberoğlu & Çağanağa, 2018; Raharjo et al., 2021). In addition, the ability of students to determine appropriate learning strategies is an important factor in the students' overall problem-solving abilities.

The level of autonomy that students exhibit when it comes to their own education in relation to online learning is still quite low. Both the learner and their environment play a role in their degree of autonomy in the learning process. Discipline, self-confidence, responsibility, learning motivation, and attitude are all internal factors that come from within a student (Afandi, 2022; Aisah, 2018; Hidayat et al.,

2020). The role of the teacher and the innovations that are used in learning and infrastructure are examples of external factors that influence students' ability to learn independently (Oktarin et al., 2018; Qomariyah & Wulandari, 2021). The implementation of the appropriate technology has the potential to foster students' autonomy in learning as well as their confidence in pursuing educational opportunities that are not exclusively provided by teachers. Students need to be able to learn independently during this pandemic, but they also need to be able to determine what materials they need, find sources that are relevant to their needs, choose learning strategies, and be able to evaluate their learning processes and outcomes. During this pandemic, students need to be able to learn independently (Afandi, 2022; Banat & Martiani, 2020; D. A. Kusuma, 2020). It is necessary for students to have access to high-quality online education in order to protect their ability to learn independently in the event of a pandemic.

In high school, one of the areas of study that falls under the umbrella of mathematics is statistics. The study of scientific methods to collect, organize, infer, present, and analyze data, as well as draw conclusions that are proven correct in order to obtain acceptable decisions is the focus of the field of statistics, which is a subfield of applied mathematics (Firmansyah, 2017; Syahri, 2014). Statistics is a resource that is utilized in a variety of fields (Bina, 2020; Fitri, 2011). According to an opinion of previous study states that students have varying statistical learning abilities, depending on the intelligence of their initial mathematical abilities (hard skills) (Firmansyah, 2017). At the high school level, the study of statistics requires critical thinking and the ability to solve problems. Students are required to think critically in order to determine the appropriate mathematical model and analyze the appropriate steps for problem-solving when working with statistical problems. Students therefore require skills in problem-solving and the ability to learn independently, both of which they must possess. Because of the constraints that meetings impose, it is essential to select the appropriate learning model in order to ensure that students comprehend the statistical content by developing their capacity for independent study and proficiency in problem-solving skills. Polysynchronous Learning is the type of online education that can be completed in this manner.

As a result of the findings of the prior research, it is necessary to conduct additional research in order to evaluate the applicability of the issue in the current environment. It is anticipated that the best solution will involve a combination of synchronous and asynchronous learning carried out online. Considering the information presented above, the goals of this research are to evaluate polysynchronous learning of statistical material, measure the problem-solving ability of high school students, and determine how independent they are in their learning.

2. METHODS

This study is a combination of descriptive and quantitative research methods. The quantitative methodology was used in this study. Research of this nature is referred to as descriptive research. Narrative descriptions serve as the format for the presentation of the data analysis. Both quantitative and qualitative types of data were collected during this research. Narrative descriptions serve as the format for the presentation of the data analysis. Both quantitative and qualitative types of data were collected during this research. The subjects in this study consisted of 29 high school students in Malang. The capacity of pupils to find solutions to issues and the level of self-reliance attained by students as a result of online education are the foci of this investigation. Using observation sheets, several tests, and questionnaires, all of which were helped by a Google form, we were able to collect data on the implementation of polysynchronous learning, students' capacity to solve problems, and their level of independent learning. The scoring of the data, the calculation of percentages, and the drawing of conclusions are the three phases that make up data analysis.

The implementation of polysynchronous learning at meetings 1-3 was observed by three observers, namely the tutor teacher (O-1), fellow tutor teachers (O-2), and colleagues (O-3), each of whom was given an observation sheet. The scoring scale for the implementation of polysynchronous learning uses a scale of 1-4, each of which describes not being implemented, implemented but lacking, implemented quite well, implemented well. Drawing conclusions from the results of the learning evaluation using very good, good, sufficient, and poor criteria with the value of each percentage being

$P \geq 85\%$, $70\% \leq P < 85\%$, $56\% \leq P < 70\%$, and $P < 56\%$, respectively. Furthermore, the rubrik of problem-solving is show in Table 1. Drawing conclusions of student problem-solving ability results (P) using very high, high, medium, and low criteria with their respective grades of of $P \geq 85\%$, $70\% \leq P < 85\%$, $50\% \leq P < 70\%$, and $P < 50\%$, respectively. The learning independence questionnaire was developed using a 4-Likert scale of 21 items. The reliability of the learning independence questionnaire is 0.815 which is classified as very high. The observation sheet has 16 items, each of which receives a score of one point if it is met and zero points if it is not met. The reliability of the learning independence observation sheet is 0.699 which is relatively high. Independence learning (K) criteria is categorized into 5 categories: very high, high,

medium, low, and very low with each value being on the range of values of $K \geq 80$, $60\% \leq K < 80\%$, $40\% \leq K < 60\%$, $20\% \leq K < 40\%$, *and* $K < 20\%$, respectively.

Table 1. Rubric of Problem-Solving Ability Scoring

No.	Indicators	Sub Indicators	Score
1	Understanding the problem	Determining the known elements of the problem	3
		Identify what is being asked	3
2	Create a strategy for solve the problem	Drawing up a mathematical model for solving problem	3
3	Solve the problem using the created strategy	Using strategies to solve problems.	7
		Interpret the results according to the initial problem and use mathematical language well	8
4	Check the results that have been obtained	Write down the work steps that are in accordance with the problem	3
		Writing down conclusions	2

3. RESULT AND DISCUSSION

Results

Polysynchronous Learning

This is a polysynchronous learning process consisting of three meetings, with minutes from each meeting following below. One problem-solving ability test question is administered at the end of each and every lesson in order to evaluate the student's progress. A learning independence observation activity was carried out during the third meeting, and after the conclusion of the third meeting, the students were tasked with filling out the learning independence questionnaire. Table 2 contains descriptions of all of the stages of the learning activities.

Table 2. Polysynchronous Learning Evaluation

Activites	Teacher Behavior	Meeting to -									Ave-rage
		1			2			3			
		O1	O2	O3	O1	O2	O3	O1	O2	O3	
Activity 1 Introduction	Through the Whatsapp group the teacher starting the lesson	4	4	4	4	4	4	4	4	4	4
	Conveying motivation about what can be obtained (goals & benifit) by studying the material	3	3	4	4	4	4	4	3	3	3.56
	The teacher asks the students to fill in the attendance	4	4	4	4	4	4	4	4	4	4
	The teacher gives worksheet regarding the material provided	4	4	4	4	4	4	4	4	4	4
Activity 2 Delivery of material to students (*Whatsapp*)	The teacher divides three problems to the students, each student gets one problem to solve	4	4	4	4	4	4	4	4	4	4
	Teachers allow students to ask questions through Whatsapp groups and give other students the opportunity to answer	3	3	3	3	3	3	4	3	4	3.22
Activity 3 Discussion activities (*Google Meet*)	The teacher asks students to discuss in the breakout room according to the division of problems	4	4	3	3	4	4	4	4	4	3.78
	The teacher asks the students to return to the main room	4	4	4	4	4	4	4	4	4	4
	The teacher asks students to present the results of the	3	3	4	3	3	3	4	4	3	3.33

Activites	Teacher Behavior	Meeting to -									Ave-rage
		1			2			3			
		O1	O2	O3	O1	O2	O3	O1	O2	O3	
	discussion of a given problem in order to exchange information with each other										
	Teachers allow other students to respond	3	3	3	3	3	3	3	3	3	3
	The teacher gives reinforcement of the material	4	4	4	4	4	3	4	4	4	3.89
	The teacher creates a two-way discussion with students	3	3	3	3	3	4	3	3	4	3.22
	The teacher guides the students so that all students are actively discussing by giving passive students the opportunity to express their opinions.	3	3	3	3	3	3	3	3	3	3
	The teacher gives a quiz to find out the students' understanding of the material presented	4	4	4	4	4	4	4	4	4	4
Activity 4 Closed the lesson (Google Meet)	Through Google Meet , teachers would like to thank the students who have participated in the learning activities.	3	4	4	4	3	4	4	3	4	3.67
	The teacher conveys information on what material will be studied for the next meeting.	3	3	3	3	3	3	3	3	3	3
	The teacher closed the lesson	4	4	4	4	4	4	4	4	4	4
	Average	**3.52**	**3.59**	**3.65**	**3.59**	**3.59**	**3.65**	**3.76**	**3.59**	**3.71**	**3.63**

According to the data presented in Table 2, it can be seen that the polysynchronous learning observations resulted in an average score of 3.63. In order to achieve a success rate of 90.7% throughout polysynchronous learning.

Students' Mathematical Problem-Solving Abilities

The results of the analysis of students' mathematical problem-solving abilities are presented in Table 3. Based on the data presented in Tabel 3, it is known that the problem-solving abilities of 29 students were spread on very high, high, medium, and low criteria with percentages of 37.9%, 24.1%, 17.2%, 20.7%, respectively. The mathematical problem-solving abilities of the student can be seen in Table 4 below, which is presented for each stage of the Polya. The percentage of students' problem-solving abilities is show in Table 4.

Table 3. Students' Mathematical Problem Solving Abilities

Criterion	Frequency	Percentage
Very high	11	37.9
High	7	24.1
Medium	5	17.2
Low	6	20.7
Total	**29**	

Table 4. The Percentage Of Students' Problem-Solving Abilities

Problem Solving Stage	Troubleshooting Capabilities	Number of Students	Percentage	Average	SD
Understanding the Problem	Very hight	3	10.3	69.49	12.03
	High	15	51.7		
	Medium	11	37.9		
	Low	0	0		
Planning for solve the problem	Very hight	12	41.4	78.16	20.34
	High	6	20.7		
	Medium	9	31.0		
	Low	2	6.9		
Executing the plan	Very hight	12	41.4	75.03	24.37
	High	7	24.1		
	Medium	4	13.8		
	Low	6	20.7		
Checking Back	Very hight	9	31.0	71. 30	21.44
	High	6	20.7		
	Medium	12	41.4		
	Low	2	6.9		
Total	Very hight	11	37.9	73.62	17.8
	High	7	24.1		
	Medium	5	17.2		
	Low	6	20.7		

Table 4 shows that there is an average and a standard deviation for each stage that was obtained. The average and standard deviations obtained during stage 1 were 69.49 and 12.03, respectively. During stage 2, the values were 78.16 and 20.34, stage 3 obtained 75.03 and 24.37, and stage 4 obtained 71.30 and 21.44, respectively. Furthermore, the total of the four stages obtained average and standard deviation of 73.62 and 17.8.

Students' Learning Indepedence

The questionnaire for students' learning independence that was used in this research contains four indicators. These indicators are discipline, self-confidence, initiative, and discipline. There are six statements that make up the "discipline" indicator, with four positive statements and two negative statements. There are five statements that make up the "initiative" indicator, with three positive statements and two negative statements. There are seven statements that make up the "confident" indicator, with five positive statements and two negative statements. There are three statements included in the "responsibility" indicator, two of which are positive and one of which is negative. The following table displays, as percentages, the responses that 29 different students gave to the questionnaire. The questionnaire was given to the students to fill out. Students' learning independence is show in Table 5.

Based on the Table 5, the percentage of indicators of learning independence is obtained, include discipline, initiative, confidence, and responsibility, in that order 74.28%,68.62%,68.47%, and .68.39%. Furthermore, all elements of a student's learning independence are of a high category. Table 6 show the learning independence of students whose data is obtained through questionnaires.

According to Table 6 shows that number of students with the category of student learning independence is very high, high, and medium as much as 6.9%, 82.8%, and 10.3%, respectively. Furthermore, Table 7 shows the students' learning independence whose data is obtained through observation during the study.

Table 5. Students' Learning Indepedence

Students' Learning Independence	Percentage	Category
Discipline	74.28	High
Initiative	68.62	High
Confident	68,47	High
Responsibility	68.39	High

Table 6. Students' Learning Independence based on Questinaire

Students' Learning Independence	Frequency	Percentage
Very High	2	6.9
High	24	82.8
Medium	3	10.3
Total	**29**	**100.0**

Table 7. Students' Learning Independence based on Observation

Students' Learning Independence	Frequency	Percentage
Very high	2	48.3
High	24	21.0
Medium	3	20.7
Total	**29**	**100.0**

Base on Table 7, the data demonstrates that the number of students with the category of student learning independence is very high, high, and medium as much as 48.3%, 21%, and 20.7%, respectively

Discussion

In this research, polysynchronous learning has been implemented with a significant amount of success. The students' ability to solve problems while undergoing polysynchronous learning on criteria is very high, and students' independent learning on high criteria is also achieved. This finding supports by other researchs who found that polysynchronous learning can make learning more active, interactive, and collaborative (Eady & Woodcock, 2010; Mayer & Sekayi, 2018; Robertson et al., 2018). It means that learning can shift from being instructor-centered to being student-centered. It is also in line with other study who posit that polysynchronous learning can facilitate collaborative problem solving, role-playing, whole-class discussions, and collaborative design projects (Bower et al., 2014). Also, it is strengthen that polysynchronous learning has the potential to create a more engaging environment in the classroom (Robertson et al., 2018).

The ability of solving mathematical problems indicates that one possesses a high level of capability to solve mathematical problems when learning polysynchronous statistical materials. At each stage, it demonstrates the ability to understand problems, formulate a solutioan plan, solve problems, and check the answers to each of them based on criteria that range from medium to very high. This research shows a different result from previous research, in which this research's result is higher than that of two previous studies (Andayani & Nadiyah Lathifah, 2019; Zakiyah et al., 2021). Both studies even indicated that understanding the problem is at a low criterion. The findings of this research are consistent with the findings study which found that a moderate level of understanding of the issue was present at the time of the study's completion (Kamilia & Imami, 2018). On the other hand, this result is not as good as the one, who conducted research and discovered that at the stage of understanding the problem, a high criterion exists (Martin & Kadarisma, 2020). According to previous study, there are students who write down things that they already know, and there are also students who do not write down things that they already know (Akbar et al., 2017). Students who do not write down things that they have already understood and ask about it, tend to find direct solutions to problems, which saves more time.

In this study, the high criteria apply to the process of formulating a plan or determining how to address problems. Indicators of making plans or ways of completion are on very high criteria. Nevertheless, it is higher than the research that have conducted, all of which are at low criteria (Bernard et al., 2018; Kamilia & Imami, 2018; Zakiyah et al., 2021). In addition, the studies carried out on moderate criteria, students make use of methods that are less relevant, which leads to errors in the subsequent procedures. The high criteria take into account the presence of the third indicator of success in solving the problem in this study. The finding is accordance with the findings of the study which suggests that the execution of plans or the performance of calculations is a significant factor (Andayani & Nadiyah Lathifah, 2019; Tawary et al., 2021).

The results of the analysis of problem-solving ability using the Polya stage provide a practical contribution for the teacher, such that in order to solve mathematical problems, the Polya model needs to be equipped with an assessment rubric. This lets students know which aspects of the problem are evaluated by the instructor. Students will find it very useful to be able to write down the components they know and ask questions about during the stage of understanding the problem and checking the answers once more with the assistance of this assessment rubric. Regarding the degree to which students are able to learn

independently, the data reveals that each indicator of student learning independence has been achieved by more than 68% of students. In this study, the indicators relating to discipline have the highest percentage. It is in line with previous study state the score for indicators of disciplined behavior is the highest (Aisah, 2018; Hidayat et al., 2020). It is also consistent with the research findings which found that students' potential for learning independence can be helped along by disciplinary attitudes (Oktarin et al., 2018).

A percentage of 68.62% has been assigned to the initiative indicator. This is in accordance with the findings of previous studies which indicate that the perspective of the initiative is still considered to fall within the moderate criteria (Sembiring & Wardani, 2021; Suleang et al., 2021). According to previous study the initiative indicator is considered to be in the good category (Tamura, 2017). Then, other researchs obtained the result that the attitude of initiative is still relatively low (Aisah, 2018; Hidayat et al., 2020). Students are aware that their learning efforts are significantly greater when they are participating in traditional classroom settings, as opposed to participating in online learning. The indicator has a high level of confidence in the total amount. In accordance with the findings which indicate a confident percentage of 81,82% (very high) (Banat & Martiani, 2020).

It was determined, on the basis of the findings of the research on student learning independence that was described earlier, that student learning independence in Polysynchronous learning on statistical material consists of three criteria, namely very high, high, and medium. This conclusion was reached as a result of the research that was described above. Students who have learning independence with very high criteria meet all of the indicators, according to the results of questionnaires and observations. These indicators include having a high attitude of discipline, initiative, confidence, and responsibility. This is consistent with the viewpoint expressed by previous study who believe that students who have a very high level of learning independence are able to perform admirably across the board (Suleang et al., 2021). However, other study stated that students still have a relatively low level of independence in learning because students are not used to learning online (Hidayat et al., 2020). This is the main reason why students still have a low level of independence in learning.

Students who are able to meet all indicators, such as having a disciplined attitude, being proactive, being self-confident, and taking responsibility for their actions, are considered to have high criteria or independent learning independence. However, students still do not have a healthy attitude of self-confidence. Students who have a high level of learning independence are able to meet all indicators, according to the findings state even though there are a few indicators that are still not met properly (Suleang et al., 2021). In addition, students who have a moderate amount of learning independence also have all of the attitudes that are present on the indicators of learning independence, even though they are not yet fully good. Students whose level of learning independence falls into the moderate category are considered to have sufficient learning independence, despite the fact that they have not been able to fully carry out activities that demonstrate regular levels of learning independence. This finding is consistent with their findings.

4. CONCLUSION

Students have the ability to solve mathematical problems and the independence to learn high-level categories, which makes it possible for the implementation of polysynchronous learning of statistical material to be carried out in an appropriate manner. The findings of this study suggest that educators can make use of polysynchronous learning to enhance the problem-solving abilities and independent learning capabilities of their pupils, regardless of whether they are living in a pandemic or new-normal environment. To provide researchers with additional suggestions, it is necessary to conduct research on the connection between independent learning and the ability of students to find solutions to problems.

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