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LEARNING THE PERIODIC SYSTEM OF ELEMENTS WITH MICROSOFT TEAMS TO IMPROVE LEARNING INDEPENDENCE

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Abstract: In hybrid learning during the Covid-19 pandemic like this, the intensity of face-to-face meetings between students and teachers is still not fully back to normal. Therefore, students are expected to be able to learn independently. In realizing a learning independence, it is also necessary to use learning media that are relevant to current learning conditions One of the learning media that can be used is Microsoft Teams. *Microsoft Teams* is a platform developed by Microsoft and released in 2017. This study aims to increase student learning independence by using *Microsoft Teams* on the material periodic system elements. The research design used is a one group pretest posttest design. This research was conducted in class X MIPA 5 SMA Al-Islam Krian Sidoarjo with a total of 37 students. The research instruments used were student activity observation sheets, learning independence questionnaires, learning independence observation sheets, and student response questionnaires. The results showed that the percentage of relevant student activities while using *Microsoft Teams* was 96%. Students learning independence has increased and they gave a positive response on the use of *Microsoft Teams* so that it can be concluded that the use of *Microsoft Teams* can increase student learning independence.

Keywords: Microsoft Teams, learning independence, hybrid learning, Covid-i9

Abstrak: *Dalam pembelajaran hybrid di masa pandemic Covid-19 seperti ini, intensitas tatap muka antara siswa dengan guru masih belum kembali seperti semula. Oleh karena itu, peserta didik diharapkan dapat belajar dengan mandiri. Dalam mewujudkan suatu kemandirian belajar juga perlu adanya penggunaan media pembelajaran yang relevan dengan kondisi pembelajaran saat ini. Salah satu media pembelajaran yang dapat digunakan adalah Microsoft Teams. Microsoft Teams adalah suatu platform yang dikembangkan oleh Microsoft dan dirilis di tahun 2017. Penelitian ini bertujuan untuk meningkatkan kemandirian belajar siswa dengan menggunakan Microsoft Teams pada materi system periodic unsur. Desain penelitian yang digunakan adalah one group pretest posttest design. Penelitian ini dilaksanakan di kelas X MIPA 5 SMA Al-Islam Krian Sidoarjo dengan total 37 siswa. Instrument penelitian yang digunakan yaitu lembar observasi aktivitas siswa, angket kemandirian belajar, lembar pengamatan kemandirian belajar, dan angket respon siswa Hasil penelitian menunjukkan bahwa persentase aktivitas siswa yang relevan selama menggunakan Microsoft Teams sebesar 96%. Kemandirian belajar siswa menunjukkan peningkatan dan siswa memberikan respon positif terhadap penggunaan Microsoft Teams, sehingga dapat disimpulkan bahwa penggunaan Microsoft Teams dapat meningkatkan kemandirian belajar siswa.*

Kata kunci: *Microsoft Teams, kemandirian belajar, pembelajaran hybrid, Covid-19*

INTRODUCTION

Chemistry is a science that studies natural phenomena around the structure, properties, composition, changes and energy contained (Harefa et al., 2020). Generally, students think that chemistry is a difficult subject. This is because chemistry combines theoretical concepts and mathematical concepts in learning (Bintarawati & Citriadin, 2020). Students' assumptions in this case cause students' interest in learning chemistry to decrease so that in the future it can have an impact on their chemistry learning outcomes (Putri & Rinaningsih, 2021).

Teacher creativity when teaching is needed in order to achieve learning goals and the success of the educational process (Selatan et al., 2016). Teachers can develop new teaching strategies by applying various ways such as the application of learning models or new learning media that can reduce students' learning difficulties so that student learning outcomes can increase (Azmi *et al*., 2019).

During the Covid-19 pandemic, learning activities in Indonesia were disrupted. At the beginning of the pandemic, all learning activities were carried out online (Tuti *et al*., 2020). But gradually, the number of Covid-19 patients may decrease so that along with this the implementation of learning can slowly return to normal, although not completely.

Based on Surat Keputusan Bersama Menteri Pendidikan dan Kebudayaan, Menteri Agama, Menteri Kesehatan, Menteri Dalam Negeri Nomor 03/KB/2021, Nomor 384 tahun 2021, Nomor HK.01.08/MENKES/4242/2021, Nomor 440-717 tahun 2021 concerning implementation guidelines learning during the *Coronavirus Disease 2019* (covid-19) pandemic, stated that the implementation of learning during the pandemic *Corona Virus Disease 2019* (covid-19) was carried out in a hybrid manner, namely limited face-to-face learning while still adhering to health protocols and/or distance learning. Hybrid learning is one of the efforts of the Inspectorate General of the Ministry of Education, Culture, Research, and Technology in order to adapt and prepare learning activities to coexist with the COVID-19 (Kemendikbud *et al.*, 2021). Face-to-face learning at the secondary education level is carried out with a maximum number of 18 students per class from the initial standard of 28-36 students. While distance learning is carried out through relevant platforms such as *google meet, zoom*, *study houses*, etc. The learning time in this hybrid learning is only 25 minutes per lesson hour.

Under these conditions, the intensity of face-to-face meetings between students and teachers has not returned to its original state. Therefore, students are expected to be able to learn independently. Learning independence combined with student activity is one of the supporting factors for the implementation of the learning process. Learning independence has an effect on student

learning outcomes where the higher the level of education, the learning independence required is also higher (Yuliati & Saputra, 2020).

Learning independence is one of the learning skills where a person is able to control, encourage, and evaluate himself (Bungs *et al.*, 2019). Independent learning can create an integrated learning situation accompanied by metacognitive activities, motivational behaviors and beliefs, which are structured and regulated to support the achievement of students' personal goals (Sartyka et al., 2021).

A person is said to have independent learning if he has his own desire to learn, solve learning problems, motivate himself and be responsible for himself in carrying out his learning obligations as a student. Indicators of students are said to have independent learning if they are confident, disciplined, initiative, responsible, and have high learning motivation (Winata *et al.*, 2021). Independent learning of students has a role in determining learning outcomes. Students who have high learning independence can manage their own needs while studying such as dividing time, controlling themselves when thinking, developing learning strategies, implementing, evaluating and reflecting on the results obtained (Nurhayati, 2017).

The Elemental Periodic System is one of the tenth grade chemistry materials in the odd semester in the 2013 curriculum. The Elemental Periodic System is a simple and basic material in chemistry but requires a good focus on learning because it is abstract and contains a lot of rote material (Rahmatsyah & Dwiningsih, 2021) so that students' learning independence is also needed in studying the Elements Periodic System material in order to master the material well. In realizing learning independence, it is also necessary to use learning media that are relevant to current learning conditions which are expected to help realize effective, fun learning, and can make it easier for students to understand learning material (Tafonao, 2018).

The learning media used must be adjusted to the type and characteristics of the material to be taught by considering the teacher's understanding and ability about the media used (Maimunah, 2016). This is because the use of learning media is strongly influenced by the very rapid development of education which has an impact on the applicable education system and the development of student learning psychology (Tafonao, 2018). The selection of the type of learning media to be used is one of the important factors in achieving a learning goal. The use of inappropriate types of media can have an impact on the learning process that is not optimal so that the material being taught is not conveyed to students properly (Aghni, 2018).

One of the learning media that can be used is *Microsoft Teams. Microsoft Teams* is a platform developed by Microsoft and introduced in 2017. *Microsoft Teams* is a team collaboration hub in Microsoft 365 that makes all the users, tools, and content a team need so they can be more connected

by bringing chat, meeting, assignment, file features , as well as shared applications packaged in a single learning management system (LMS) (Martin & Tapp, 2019). *Microsoft Teams* integrates all features outlook into a channel form. This channel is accessible to all users. The chat feature found in *Microsoft Teams* serves as a substitute for short emails that allow teachers and students to interact and discuss (Sobaih et al., 2021).

By using features in Microsoft Teams, students can learn material on the periodic system of elements without being hindered by space and time which then also helps students to improve their learning independence.

Based on this statement, the purpose of writing this article is to improve student learning independence by using *Microsoft Teams* on the material of the periodic system of elements.

METHODS

This research is a pre-experimental study with a *one group pretest-posttest design.* This design can be described as follows.

O_1	X	O_2

Description:

O_1 = initial test (test without the platform of the *Microsoft Teams* platform)

X = treatment (treated in the form of the application of the platform *Microsoft Teams*)

O_2 = final test (test after giving treatment)

The research target was 37 students from class X MIPA 5 SMA Al-Islam Krian Sidoarjo. The research instruments used were student activity observation sheets, learning independence questionnaires, learning independence observation sheets, and student response questionnaires. Research instruments are declared valid if the percentage of eligibility reaches 61% (Riduwan, 2012). The instrument used has obtained validation from chemistry lecturers at the State University of Surabaya with a feasibility percentage of 83.4%. The data collection technique used the observation method, the questionnaire method, and the test method. The data obtained were then analyzed descriptively quantitatively by describing the assessment in the form of a percentage.

Observations on student activities were carried out while using *Microsoft Teams* which were observed by two observers that were then analyzed using the following formula:

$$\% \text{ Student Activity} = \frac{\Sigma \text{ Frequency of student activity appearing}}{\Sigma \text{ Overall activity frequency}} \; x \; 100\% \qquad (1)$$

(Arifin, 2011)

Observations are used to determine student activities related to independent learning. Student activities can be said to be carried out well if the percentage of relevant student activities reaches 61%. Learning independence was measured using a learning independence questionnaire given at the beginning and end of learning to determine the differences in student learning independence. The questionnaires used were scored using a Likert scale: (1) Never, (2) Rarely, (3) Often, and (4) Always (Purwanto, 1994).

The researcher identified the initial conditions by conducting a *pretest* (initial ability test), then treatment (the use of *Microsoft Teams* in learning the periodic system of elements), and the final condition was carried out *posttest* (final ability test). The *pretest* results obtained will be compared with the *posttest* results and analyzed using n-gain, normality test and T-test. The normality test aims to find out that the data results normally distributed calculated using *SPSS version 25 for windows software.* The following is the formulation of the normality test hypothesis.

H_0: The data is normally distributed

H_1: The data is not normally distributed

If the value of sig. >0.05 then it can be said that the data is normally distributed.

The T-test aims to determine the difference between the average *pretest* scores and *posttest* was performed using a *paired sample T-test* with *SPSS version 25 for windows software* with the following hypothesis.

H_0: there is no difference in the average scores *pretest* and *posttest*

H_1: there is a difference in the average scores. *pretest* and *posttest*

If the value of sig.2 tailed <0.05 then it can be said that there is a difference in the average score of *pretest* and *posttest.*

The results of the calculation of the gain index value are used to determine the increase in student learning independence. The results of the data obtained are then interpreted based on the value of *n-Gain* in the table 1.

Table 1. Category n-Gain (g)

***n-Gain* (g)**	**Interpretation**
g > 0.7	High
0.3 < g < 0.7	Medium
G ≤ 0.3	Low

(Hake, 1999).

Student learning independence was also measured using an independent learning observation sheet for each student conducted by two observers. Observations were made by observing every aspect of learning independence, namely discipline, self-confidence, initiative, responsibility, and learning motivation (Winata *et al.*, 2021). The amount obtained is then converted into a percentage and interpreted based on the table 2.

Table 2. Classification of Student Learning Independence

Percentage	**Criteria**
0% - 49%	Very Less Independent
50%- 59%	Less Independent
60% - 69%	Quiet Independent
70% - 89%	Independent
90%-100%	Very Independent

Student response questionnaires were used to determine student responses to the use of Microsoft Teams. The results of student responses get positive results if the percentage obtained reaches 61%.

RESULTS AND DISCUSSION

Student's Activities

Student activities during learning were analyzed using student activity observation sheets which were observed by 2 observers every 5 minutes. Observers observe student activity while using *Microsoft Teams.* Student's activity observation sheets are used to determine student activities related to independent learning. Based on Figure 1, it can be seen that learning independence has been applied during learning.

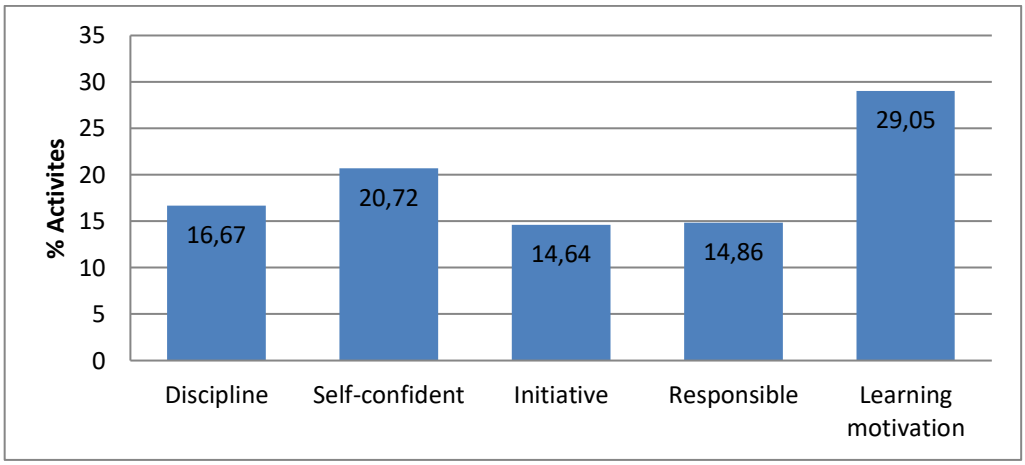

Figure 1. Percentage of Student Activities on Independent Learning

In Figure 1 it can be seen that the results of each activity indicator of learning independence are 16.67% of student activity time is used to practice discipline, 20.72% of student activity time is used to practice self-confidence, 14.64% of student activity time is used to practice initiative attitudes, 14.86% of student activity time is used to practice responsible attitudes and 29.05% of student activity time is used to practice increasing student motivation.

Student activities can be said to be good if the percentage of relevant activities reaches 61% (Riduwan, 2015). Figure 2 shows that the percentage of relevant activities is 96% and irrelevant activities are 4% so that it can be said that learning using *Microsoft Teams* is carried out well.

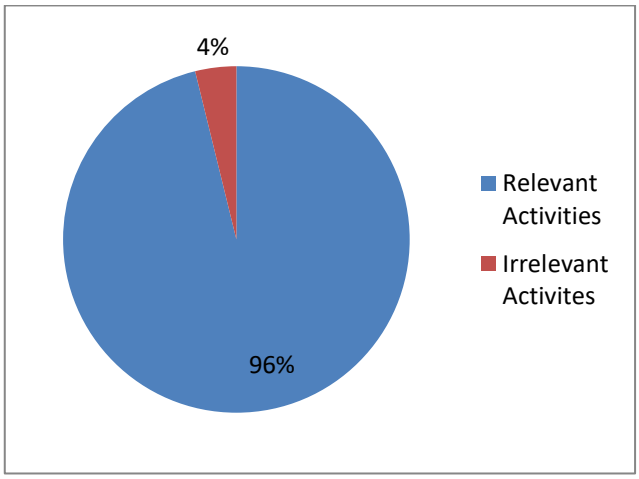

Figure 2. Percentage of Student Activities

Learning Independence

Learning independence can be indicated in the ability of students to know their learning styles, determine learning strategies in an effort to obtain optimal learning outcomes (Ningsih *et al*., 2017). Student learning independence was analyzed using a learning independence skills questionnaire. This questionnaire was given at the beginning and end of the lesson so that the initial and final

independence scores were then compared and analyzed to measure the differences in student learning independence before and after being treated in learning. The data analysis technique used are n-Gain, normality test and *paired sample T-test*. The assessment is based on indicators of student learning independence, including 1) Self-confidence, 2) Discipline, 3) Initiative, 4) Responsibility, and 5) Learning motivation. The results of the assessment of learning independence can be seen in table 3.

Table 3. Initial Frequency of Student Learning Independence

Percentage	Criteria	Frequency
54%	Very Less Independent	1
55 - 59%	Less Independent	13
60 - 75%	Quite Independent	22
76 - 85%	Independent	1
86 - 100%	Very Independent	0

In table 3 it can be seen that students still have low learning independence. To support students in hybrid learning during the *Covid-19* pandemic, it is necessary to apply learning media that can help increase student learning independence. Students are then given treatment in the form of using learning media *Microsoft Teams* which is adjusted to the indicators of learning independence. After being given treatment, students were asked to fill out a final learning independence questionnaire. This questionnaire aims to determine the differences in student learning independence before and after the treatment.

Table 4. Final Frequency of Student Learning Independence

Percentage	Criteria	Frequency
0 - 54%	Very Less Independent	0
55 - 59%	Less Independent	0
60 - 75%	Quite Independent	0
76 - 85%	Independent	34
86 - 100%	Very Independent	3

Based on table 4 it can be seen that students' learning independence has undergone changes as evidenced by the frequency of students entering the independent and very independent criteria increasing from before.

The initial and final independence questionnaire scores obtained were then tested using the normality test and the T test. The following are the results of the normality test of the initial and final independence questionnaire scores.

Table 5. Normality Test Results Independent Questionnaire Score

Tests of Normality						
	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
mandiriawal	.109	37	.200*	.985	37	.883
mandiriakhir	.164	37	.013	.951	37	.100

Normality test used is the Shapiro-Wilk test. The results of the normality test show that the value of sig. early 0.883 and sig. final 0.100 which means that the value of sig. > 0.05 so it can be said that the data from the initial and final independence questionnaires are normally distributed. Next, the T test was carried out with the results shown in table 8.

Table 6. T test results

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper			
Pair 1	awal – akhir	-19.81081	4.20210	.69082	-21.21186	-18.40976	-28.677	36	.000

The T-test used is a *paired sample test* with the results showing the sig value. (2-tailed) 0.000 which means that there are differences in learning independence before and after implementing learning using *Microsoft Teams.*

The results of the gain index value obtained an average of 0.63 which means that the increase in student learning independence is in the medium category. This can prove that *Microsoft Teams* can be used to increase student learning independence.

Student learning independence was also measured by using the independence observation sheet. Observations were made by 2 observers to each student when using *Microsoft Teams* so that the level of independence of each student could be known. The results of observations on learning independence can be seen in table 7.

Table 7. Observations on student learning independence

INITIAL NAME	PRESENTATION SCORE	LEARNING CRITERIA
AFM	91.67	Very Independent
AFR	51.67	Less Independent
AZR	80.00	Independent

ASNF	76.67	Independent
ADI	91.67	Very Independent
ANP	100.00	Very Independent
ADAAW	96.67	Very Independent
ACPA	96.67	Very Independent
CEPR	91.67	Very Independent
CSS	76.67	Independent
DAA	70.00	Independent
DF	71.67	Independent
DS	73.33	Independent
FAP	96.67	Very Independent
FDA	70.00	Independent
GART	60.00	Quite Independent
HN	95.00	Very Independent
IDA	81.67	Independent
KLCR	80.00	Independent
LIES	75.00	Independent
MAK	91.67	Very Independent
MSH	56.67	Less Independent
MATH	81.67	Independent
MFNDR	68.33	Quite Independent
MFB	71.67	Independent
MWA	95.00	Very Independent
NRF	70.00	Independent
NH	76.67	Independent
NIDA	86.67	Independent
PWA	66.67	Quite Independent
RNA	66.67	Quite Independent
RWI	66.67	Quite Independent
RSA	96.67	Very Independent
SIWS	65.00	Quite Independent
SUN	86.67	Independent
TEM	70.00	Independent
VGA	73.33	Independent

Based on table 7 in get the average percentage of students who fall into the independent category of 48.65% and very independent category of 29.73%. This shows that the majority of students have experienced increased learning independence when using *Microsoft Teams.*

With independent learning, students will motivate themselves to be independent and proactive in mastering the material being studied so that they do not always depend on the teacher (Ningsih, et al, 2017). There are three stages in the learning independence cycle, namely:

1. Planning for learning activities
2. Monitoring progress obtained during the implementation of the plan
3. Evaluation of the results of implementing the plan (Ambiyar *et al.*, 2020)**.**

Student Responses

To find out student responses regarding the use of *Microsoft Teams* to increase learning independence, students were given a response questionnaire. The results of student responses showed that 72.97% of students gave a positive response so that it could be categorized as good (Riduwan, 2012). Students are also interested in using *Microsoft Teams* in studying the material for the periodic system of elements. Wea's research (2021) also states that students have a positive impression of using *Microsoft Teams* in online learning. *Microsoft Teams* has several advantages that can be the reason this platform can be used in hybrid learning and increase learning independence, namely:

1. Students are motivated to be more disciplined
2. Students can get optimal support in the learning environment
3. Make it easier for students to interact with teachers and friends even though they don't meet face-to-face
4. *Microsoft Teams* is an efficient and effective platform that can increase students' enthusiasm for learning.

This is also in line with the results of Sobaih's research (2021) which states that *Microsoft Teams* helps students to get a suitable learning experience. *Microsoft Teams* can also help students have access to information and learning resources.

Based on the results of the research above, it can be said that teachers and students can use *Microsoft Teams* in chemistry learning and in order to improve learning independence, not only in studying the material for the periodic system of elements but is also expected to help in learning other materials.

CONCLUSION

The results of data analysis and discussion in research conducted on students of class X MIPA 5 SMA Al-Islam Krian Sidoarjo indicate that *Microsoft Teams* can be used by students and teachers in studying material on the periodic system of elements to increase learning independence. *Microsoft*

Teams has a variety of features that can be leveraged to improve every aspect of student learning independence.

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