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The Effectiveness of Using Kahoot on Understanding Mathematics through Study from Home

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Abstract. The study from home (SFH) is an everyday activity in global education right now. Kahoot in learning environments is an alternative to accelerating students' interest in learning and understanding mathematics. This study aimed to measure the effectiveness of Kahoot on understanding mathematics learning through SFH. This study investigates the effect of using Kahoot in linear programming. There were 122 students, with 48 males and 74 females. Student outcomes and perceptions of Kahoot were collected to determine the effect of using Kahoot in mathematics learning through SFH. The effect of using Kahoot in mathematics was assessed using quantitative (test) and qualitative (questionnaire) methods. The analysis of the data was done using two-way ANOVA. The result of this study indicates that Kahoot can be used effectively in student motivation in learning through SFH, increased student outcomes, low-skilled students could achieve 56.56%, and understandable learning in virtual environments with Kahoot. Using the Kahoot method has an influence on skills towards the result in class virtual, a positive impact on student's experience in learning (around 90.7% of students enjoy learning with this virtual learning system), and the potential to increase the keenness of students to learn in mathematics through SFH.
Keywords: study from home, kahoot, linear programming, motivation, mathematics learning

Abstrak. Study from home (SFH) adalah kegiatan umum dalam pendidikan global saat ini. Pembelajaran Kahoot di lingkungan belajar merupakan salah satu alternatif untuk mempercepat minat siswa dalam belajar dan memahami matematika. Penelitian ini bertujuan untuk mengukur keefektifan penggunaan Kahoot dalam pembelajaran pemahaman matematika melalui SFH. penelitian ini menyelidiki pengaruh penggunaan Kahoot dalam pemrograman linier. Ada sebanyak 122 siswa, dengan 48 laki-laki dan 74 perempuan. Hasil dan persepsi siswa tentang Kahoot dikumpulkan untuk mengetahui pengaruh penggunaan Kahoot dalam pembelajaran matematika melalui SFH. Pengaruh penggunaan Kahoot dalam pembelajaran matematika dinilai menggunakan metode kuantitatif (tes) dan kualitatif (kuesioner). Analisis data dilakukan dengan menggunakan Anova dua arah. Hasil penelitian ini

menunjukkan bahwa Kahoot dapat digunakan secara efektif dalam motivasi belajar siswa melalui SFH, peningkatan hasil belajar siswa khususnya siswa yang berkemampuan rendah dapat mencapai 56,56%, dan pembelajaran yang dapat dipahami dalam lingkungan virtual dengan Kahoot. Penggunaan metode Kahoot berpengaruh terhadap keterampilan terhadap hasil belajar di kelas virtual, berdampak positif terhadap pengalaman belajar siswa (sekitar 90,7% siswa senang belajar dengan sistem pembelajaran virtual ini), dan berpotensi meningkatkan minat belajar siswa dalam matematika melalui SFH.
Kata kunci: study from home, Kahoot, program linier, motivasi, pembelajaran matematika

INTRODUCTION

The Ministry of Education and Culture of Indonesia (Kemdikbud, 2020) in SIARAN PERS Nomor: 66 /Sipres/A6/III/2020 declared study from home (SFH) during this pandemic in March 2020. The aim of creating SFH is to ensure students' right to an education as long as Covid-19 is present, to protect educators and students from the repercussions of Covid-19, and to limit the spread and transmission of Covid-19 in the school.

When SFH comes online, a lot of students do not understand what they do, and teachers have problems like how to teach students without face-to-face contact, how to operate a laptop or gadget through an online program, and how to manage the class. Students' psychological conditions and students' motivation to learn mathematics during learning during a pandemic are in the medium category (Wulan et al., 2021; Nurlaela & Nopriana, 2022). In this case, the government, the higher schools, and the universities were collaborating on a webinar about learning during the pandemic to break teachers or educators' problems.

The evolution of distance education has prosess a major challenge for education in virtual environments (Albert et al, 2012). Ready or not, educators must understand how to operate the technology in the education system. Technologies have changed the traditional way of education to the modern way in which we all need the internet to connect with each other. Many of the students did not join in on the virtual platform that the teacher made. Moreover, in mathematics, students think SFH is boring and students cannot get natural interaction with friends.

During SFH, a lot of students did not know about their timetable, mathematics was difficult for many students, and they did not understand the teachers' explanations. Students have an impact on psychosocial because they must stay

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at home for much longer, and students miss coming back to school and meeting teachers and friends at school.
The situation has changed dramatically (Ammar & Albraa, 2020). Teachers have indicated some of the main difficulties they faced when using whiteboard as an online medium for the first time: problems managing time; this problem decreased after using the medium for some time and rearranging their teaching plan. They also indicated difficulties motivating students and assessing their understanding, especially with large groups, and dealing with students' misbehaviors, particularly when students were late to enter the program or forgot to enter (Nguyen et al., 2017).

The education system is novel now. It needs evolution in the learning process from face-to-face to virtual. One of the ways is by using game-based learning. It is generally assumed that digital educational games can positively contribute to children's academic knowledge (e.g., mathematics and reading), because "learning is most effective when it is active, experiential, situated, problem-based, and provides immediate feedback" (Connolly et al., 2012).

Application of game-based elements (games, points, badges, leaderboards, competitions, rewards, etc.) in real-world activities to increase learner engagement. Through a game, we could improve students' attention in mathematics, enjoy studying online, and get the best possible outcome. Based on Vanbecelaere (2020) the effectiveness of games online can increase students' skills in math and reading and also improve their outcomes. While SFH makes students bored, putting Kahoot in an online learning system could make students pay attention to study and always wait for the game to start. Using game in learning must support game features such as feedback, interactivity, and modality that are beneficial for learner outcomes (Vusić et al., 2018).

From the teacher's experience, the solution is to try to create a game through study online. One of the famous platform that uses game-based learning is called Kahoot. This is a game-based learning platform that offers a new experience for students. This platform is used as educational technology in schools and other educational institutions and is used to review students' knowledge, for formative assessment or as a break from traditional classroom activities (Wang & Tahir, 2020), a reinforcer on students' achievement and motivation (Aras & Çiftçi, 2021) during online classes in the lockdown period (Martín-Somer et al., (2021).

In 2019, it had more than 250 million users from 200 countries (Vick, 2019). This platform is easy to create and there exist various test knowledge, user-

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generated multiple-choice, true or false, type answer, and puzzle quizzes that can be accessed via a web browser and also include trivia quizzes. Kahoot can be used to review students' knowledge, for formative assessment, or as a break from traditional classroom activities.

This engages students through gameplay, especially in SFH. It could make students enjoy studying virtually. Iwamoto et al., (2017) found that the experience of taking tests should not be as threatening or intimidating when compared to tests administered traditionally through paper and pen or pencil. The primary benefit is adding an empirically proven tool which can be implemented and that will have a positive influence on academic performance in high-stakes exams. In this novel situation, SFH could apply game-based online like Kahoot to facilitate students' learning.

There are many advantages to using Kahoot in SFH for students and teachers. Student engagement is very high. Students enjoy playing this game because it is visual, competitive to collect the best score, and it has a nice background and back sound to keep students focused on the target to solve the question in the game. On the other hand, teachers can measure their understanding of the materials that were covered more accurately through the quizzes and surveys. It can be interesting to practice.

Kahoot gives teachers the ability to perform a formative assessment as a virtual assistant. The ease of use of this platform is the most technological for teachers and students to master. This is a great way to integrate technology into SFH because it can play on smartphones, laptops, or iPads. In this regard, this study aims to determine whether studying with Kahoot is effective in understanding mathematics through a study from home. The significance of this study is that there is effectiveness in using Kahoot in online learning and enhancing students' understanding while SFH. The hypothesis in this study is that there is an influence on students learning mathematics with Kahoot while SFH.

METHOD

This is an experimental design that intends to test the purpose of the study, whether the effectiveness of using Kahoot on understanding mathematics through a study from home by using Kahoot as a game-based learning tool. The students use Kahoot on their smartphones and or laptops. Students in grade XI SMA in Siak Hulu and Pelalawan regencies will participate in September–November 2020. The subject in this experiment is 122 students. Students have different skills (high, middle, and low) and genders (48 male

participants and 74 female participants). The level of skills is known from the student's scores in the pretest.

This game was tested on students in senior high school grade eleven with heterogeneous skills. The teacher implemented the game via Microsoft 360 and Google Classroom. The teacher shares a link to room chat, through which the students play the game. Students type "Nickname" with their full name. After students play a game, a teacher shares a link about questions for students via a Google form. In this experiment, data was collected from both qualitative and quantitative sources. The result was analyzed and percentages calculated. The instruments in this experiment are Kahoot and questioners in the Google Form. Quantitative data was analyzed by the SPSS program. Tests of normality, test homogeneity, and two-way Anova. Qualitative data was analyzed using the descriptive method. Google Form provided qualitative data. The teacher gives a link through a Google form and students fill in the form after they play the game.

The data from this experiment was taken from students in grade XI who were using Kahoot. To measure the characteristics of this instrument, we need to take a test of validity and reliability. After questions are ordered, doing grain analysis as quantitative has a goal of testing question quality from content, language, and construction.

Figure 1. Output of Kahoot™

The instrument in this experiment is the effectiveness of KahootTM and questioner. The results of data from qualitative are shown as tests of normality, Anova Two-ways, and Tukey Post Hoc. Data from qualitative is shown as percentages. After all the report data on Kahoot was collected, to measure the credibility of Kahoot as a tool in mathematics learning, the items

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(questions) must be valid and reliable. These two concepts are very closely related, although their meanings are different. The differences between the two are very subtle. In research, a measurement can be reliable but not necessarily be valid. However, if a measurement is valid, then it is considered to be reliable.

RESULT AND DISCUSSION

The instrument for the experiment must be tested to know whether it is valid or reliable. The preparation data on the instruments was done with Anatest ver 4.0.5. Validity refers to the integrity and application of the methods undertaken and the precision with which the findings accurately reflect the data (Long et al., 2019). Reliability and validity in qualitative research. When applied to outcomes assessment, it is used to assess how well a measure can provide information to help improve the program under study. The result validity can be outlined in which correlations were statistically significant (p) at 0.05. By using SPSS program, correlated item-total correlation on each number's questions is valid ($p > 0.05$). The result of calculation on test of validity by using SPSS as shown in Table 1.

Table 1. Validity Corrected Item-Total Correlation

Item-Total Statistics				
No.	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Q1	4.89	2.861	.468	.371
Q2	4.56	3.028	.106	.475
Q3	4.11	3.361	.303	.390
Q4	4.33	2.750	.302	.398
Q5	4.22	3.194	.070	.479
Q6	4.22	2.944	.239	.425
Q7	4.67	3.000	.144	.458
Q8	4.89	3.111	.236	.432
Q9	4.44	3.278	.069	.482
Q10	4.67	2.500	.474	.325

From Table 1, all questions will be prerequisites to be used in the experiment of learning mathematics virtually with Kahoot.

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Level of Difficulty and Discriminant Power

The level of difficulty and discrimination indices of the items are calculated in this analysis (Özçelik in Karadag & Sahin, 2016). An item has good discriminant power if the item is able to discriminate between smart students and weak students. Before calculating the discriminant power of each item, the students were grouped into three groups based on the total score. The total score is sorted from largest to smallest.

The determination of the upper and lower groups, according to Kelly provides a limit that 27% of all students who are counted from the top group, and 27% of all students who count from the low group and 27% of 9 is 2 students in each division of level. The discrimination index of an item is the ability to distinguish high and low-scoring learners. The closer this value is to 1, the better the item distinguishes the learners who get a high score from those who get a low score.

Table 2. Discriminating Power

Subject: 9

High group/ Low group (n): 2

Number of items: 10

No. Item	High Group	Low Group	Beda	Index DP	Criteria
1	1	0	1	0.5	Good
2	2	1	1	0.5	Good
3	2	1	1	0.5	Good
4	2	2	0	0.0	Poor
5	2	1	1	0.5	Good
6	2	0	2	1	Satisfactory
7	1	0	1	0.5	Good
8	1	0	1	0.5	Good
9	1	2	-1	-0.5	Poor
10	1	0	1	50	Good

The range of discriminant power (Dp) is between -1 and 1. Score 0 means the proportion of correct answers between high and low groups are the same. If

p-ISSN 2549-8495, e-ISSN 2549-4937

index Dp > 0.5 it means "good". From Table 2, the item numbers 1, 2, 3, 5, 6, 7, 8, and 10 have an index DP > 0.5, which means these items have good criteria. Index discriminant questions are a number that shows the degree of greater or least differentiation. From that, the questions are really significant in viewing differences in student abilities, lower and higher groups (Saprama, 2017). The analysis of the items' level of difficulty follows, as shown in Figure 2.

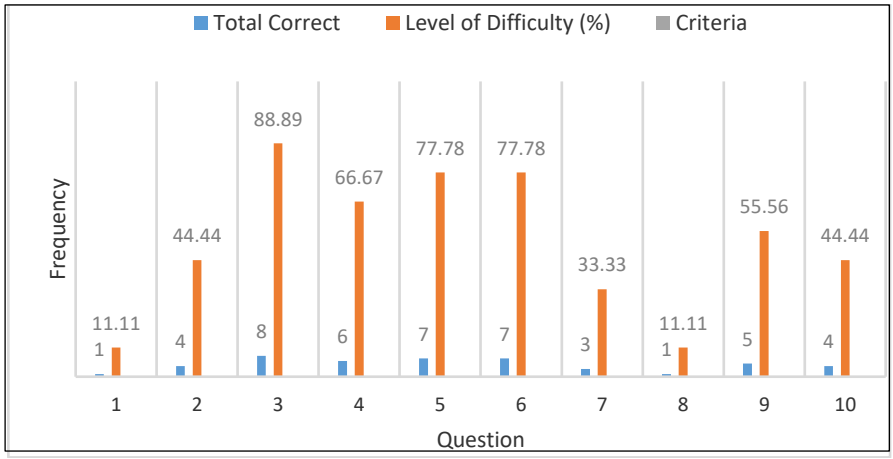

Figure 2. Level of Difficulty

From Figure 2, item 1 and 8 are difficult questions, item 2 and 7 are medium, item 4, 5, 6, 9, and 10 are easy, and item 3 is very easy. This classification depends on how many correct items the learner has had the correct answer. Therefore, these questions are good to practice because they are valid and ready to test. A measuring instrument is said to have high reliability if it provides consistent measurement results. Reliability is measured by consistency, precision, repeatability, and trustworthiness of research (Chakrabartty, 2013). It indicates the extent to which it is without bias, and hence insures consistent measurement across time and across the various items in the instruments (Mohajan, 2017).

The results of these measurements are relatively similar if the measurements are carried out on the same subject, even though they are carried out by different people and in different places. An evaluation tool (test or non-test) is called reliable if the evaluation results are relatively constant for the same subject.

Table 3. Reliability Statistics

Reliability Statistics	
Cronbach's Alpha	N of Items
.467	10

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Here is reliability to know that the questions are reliable with the minimum range is 0.400 to 0.600, becoming a "common threshold for sufficient values". The reliability test was shown in Cronbach's alpha 0.467. It means all the items in Kahoot are reliable.

Tests of Normality

An assessment of the normality of data is a prerequisite for many statistical tests because normal data is an underlying assumption in parametric testing. Because the valid samples are more than 50, the analysis data for tests of normality will use the Kolmogorov-Smirnov Test as a numerical means of assessing normality.

Table 4. Tests of Normality of Playing Kahoot

Tests of Normality							
		Kolmogorov-Smirnova			Shapiro-Wilk		
	Skills	Statistic	df	Sig.	Statistic	df	Sig.
Posttest	High	.075	41	.200*	.984	41	.839
	Middle	.144	34	.070	.950	34	.122
	Low	.121	47	.080	.872	47	.000

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

All the significant values of the Kolmogorov-Smirnov Test for each variable is p-value = 0.200 for high skill, p-value = 0.070 for middle-skill, and p-value = 0.80 for low skill. Based on the Kolmogorov-Smirnov Test above, all variables are normally distributed or p-value > α. Then a decision is the data normally distributed. Test of Homogeneity. With Levene's Test to know whether variances from a population are the same or not. If the p-value was greater than, the data were homogeneous.

Table 5. Test of Homogeneity of Variance of Using Kahoot

Test of Homogeneity of Variances					
		Levene Statistic	df1	df2	Sig.
Outcome	Based on Mean	2.526	2	119	.084
	Based on Median	2.411	2	119	.094

p-ISSN 2549-8495, e-ISSN 2549-4937

	Based on Median and with adjusted df	2.411	2	116.086	.094
	Based on trimmed mean	2.510	2	119	.086

In the Levene's Test for Equality of Variances section, the p-value boxes are more than α. Hence, can conclude that the data were homogenous. Because the data were in normality and homogeneity, then parametric statistical analysis can be carried out in this test for Two Way Anova.

Hypothesis test (two-way Anova)

The prerequisite for this test is that data must be distributed normal and have homogeneous variances. Because the data were normal and homogeneous, the hypothesis can be tested using two-way Anova (Analysis Variance). The hypothesis of this experiment is that (1) There exist significant influences between using Kahoot toward Gender on class virtual, (2) There exist significant influences between skills towards students' skills on class virtual, and (3) There exists an interaction between variable Gender and variable Skills on class virtual.

According to the outcomes of students achieved, we could answer these hypotheses with two way Anova. The actual result of the two-way Anova is whether either of the two independent variables and their interaction are statistically significant, as below in Table 6.

Table 6. Two-Way Anova Tests of Between-Subjects Effects

Tests of Between-Subjects Effects

Dependent Variable: Posttest

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	106883241.529[a]	5	21376648.306	11.259	.000
Intercept	1183655793.682	1	1183655793.682	623.424	.000
Gender	584970.041	1	584970.041	.308	.580
Skills	96411054.283	2	48205527.142	25.390	.000
Gender * Skills	3367634.407	2	1683817.203	.887	.415
Error	220241833.290	116	1898636.494		
Total	1639571156.000	122			
Corrected Total	327125074.820	121			

a. R Squared = .327 (Adjusted R Squared = .298)

From Table 6, F-value and p-value were from the hypothesis. As a result, f-value will be compared to F-table, and a decision such as:

Gender has F-value = 0.308 and p-value = 0.580. Then for F-table with $\alpha = 0.05$ and df = 1 and df-error = 116 gained F-table = 3.92. Hence, F-value < F-table = 3.904 < 3.920 and p-value > α then rejected H_0 that there is no influence of students' gender towards applied game in students' outcome. In this experiment, at the first test hypothesis p-value: 0.580 > α then rejected H_0. It means gender in student class XI Science do not significantly influence the outcome during students use the game through SFH. Gender in this game could not have any influence because this game is to determine how fast students solve the game in each question and achieve a high score.

Skills has F-value = 25.390 and p-value 0.000. Then for F-table with $\alpha = 0.05$ and df = 2 and df-error = 116 gained F-table = 3.07. Hence, F-value > F-table = 25.390 > 3.920 and p-value < α then accept H_0 that there is influence of students' skill towards applied game in students' outcome. At the second test hypothesis p-value: 0.000 < α then accepted H_0. It means skills on students' class XI Science do a significant influence on the outcome during students use the game through SFH. Skills are most suitable to build their knowledge and understanding about linear programming with the game. To get the high score, players must answer the questions as quickly as they can and must correctly, but if students do not understand linear programming, they will be stuck or lose their time and score too. In this case, students with low skills also could compete through playing the game and increasing their mathematics knowledge in linear programming.

Gender*Skills has an F-value = 0.887 and p-value 0.415. For F-table with α = 0.05 and df = 2 and df-Error = 116 gained F-table = 3.07. Hence F-value < F-table = 0.887 < 3.07 and p-value 0.415 < α then reject H_0 that there is no influence of students Gender* Skills towards applied game in students' outcome. At the third test hypothesis, p-value: 0.415 > α then reject H_0. It means the interaction between gender*skills in students class XI Science do not significantly influence learning by using games through SFH. An action that occurs when gender and skills affect each other, but statistically, there is no effect while Gender and Skills building students' knowledge about linear programming with the game.

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Statistically, significant interaction will be interpreted in the Tukey post hoc test results for the different levels of Skills, which can be found in the Multiple Comparisons table, as shown in Table 7.

Table 7. Tukey Post Hoc

Multiple Comparisons

Dependent Variable: Posttest

Tukey HSD

(I) Skills	(J) Skills	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval Lower Bound	95% Confidence Interval Upper Bound
High	Middle	1142.20*	319.610	.001	383.39	1901.01
	Low	2171.82*	294.457	.000	1472.73	2870.91
Middle	High	-1142.20*	319.610	.001	-1901.01	-383.39
	Low	1029.62*	310.224	.003	293.10	1766.15
Low	High	-2171.82*	294.457	.000	-2870.91	-1472.73
	Middle	-1029.62*	310.224	.003	-1766.15	-293.10

Based on observed means.
The error term is Mean Square (Error) = 1898636.494.

*. The mean difference is significant at the .05 level.

The interested in the differences between skills (1) High and Low (2) High and Middle, and (3) Middle and Low. The results, represents that there is a statistically significant difference between all three different skills (p-value < 0.05). A two-way ANOVA was conducted that examined the effect of skills on significant effect understanding in mathematics by improving outcome F (2, 116) = 425.390 p-value = 0.000. From Tukey Post Hoc Test, students' skills are suitable to increase student's outcome in linear programming. Because students have understood linear programming including student who has lower skill. The table indicates that the mean difference is significant in all skills (high, middle, and low). In low skill has 56.65% increasing from pretest. In middle level students has 1.44 increasing from pretest and 7.32 increasing from students in high skill. This result mentioned that learning mathematics through Kahoot could increase student's level of skills (Öz & Ordu, 2021:102) and is most suitable increasing students in low level skill. This game is a useful strategy to learning difficulty students on SFH.

There is simultaneous increasing student performance with Mean (61) = 2808.52 in Pre-test and Mean (61) = 3751.28 in post-test. There is a 33.57% significant improvement. About 90.6% of students agree if they learn mathematics by using game-based learning applied to their class. In the control class, the maximum score = 4327 and the minimum score = 750, and in the experiment class, the maximum score = 7460, with a minimum score = 750. According to students' opinions and perceptions after using this platform, this is one of the best alternatives to SFH. Students can compete with their friends at home themselves and try to achieve the best scores to be a champion. Another study supports that Kahoot has a positive effect on motivation and ambition for success, students' perception (Wang & Tahir, 2020); students with greater participation and communication with teachers obtained better marks (Chang & Kim, 2020).

The students' opinions also supported this analysis by providing feedback about 90.7% of students said Kahoot can improve their knowledge through SFH and 59.4% agreed that Kahoot is not hard to understand and could improve students' skills in programming linear. Skills had an impact on students' performance during SFH and for more than 62.5% of students, they had more confidence with their knowledge after learning linear programming through a virtual mathematics class. This is related to the study of Martín-Somer et al. (2021:156) that showed more than 70% strongly agree that Kahoot was useful to establish concepts.

Winning the podium game assisted students in storing their memories in long-term memory, allowing them to better understand the lesson and feel proud of themselves. The podium for top-five winners, helped students manage their time to solve all the questions to get the highest score, and if students got the unsolved questions, they could ask the teacher after finishing the game, but before playing, the game must be sure the connection is stable. Another study found that points in Kahoot significantly affect the students' concentration and provide a positive experience for students (Wang & Lieberoth, 2016). It supports learning in a positive perception (Abdullah & Rochmadi, 2020).

In this study, students' opinions were collected and analyzed qualitatively. 68.8% of students have ever used game-based learning in a mathematics class. In fact, 81.3% agree with Kahoot in mathematics class. Students were satisfied and got memorization when they played the game and learned at once. It helped the students obtain better marks (Martín-Somer et al., 2021:159). The efficiency of this game is really significant and can be played for the highest educational or university degree. Kahoot is used to introduce new topics

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playing through a quiz where the students do now know much about the topic from before (Castle, 2015) and they are effective learning tools (Wang & Tahir, 2020). The Kahoot could increase students' interest in SFH. About 90.7% of students gave their opinion that it is not only fun to learn linear programming from Kahoot, but students also understand what they learn and can improve their mathematics knowledge of linear programming. This result, which had already been observed (Prieto, 2019) that students had fun while learning, especially in mathematics class; not bored and joyful learning with Kahoot (Puspitasari et al., 2019). Even though students ease into playing Kahoot, 100% of students dislike studying virtual. They really want to get into a real class, gather with friends, meet teachers and friends at school, be able to go anywhere, and have a discussion at friends' houses.

CONCLUSION

According to the analysis of data and test of the hypothesis, there exists an influence between skills (high, middle, and low) towards an outcome through SFH in class XI Science. Students are supported in learning mathematics with Kahoot as game-based applied in a virtual class. The Kahoot can be used to effectively motivate students to learn through SFH, improve student outcomes, and comprehend topic linear programming. Mathematics with Kahoot can be effectively integrated into lessons in virtual. From a student perspective, most of the students easily play Kahoot. They are interested in learning mathematics and implementing this through the virtual class. Students think this game gives essential knowledge for them and also, students don't need a computer/laptop in their virtual class, because a lot of students use smartphones (Johan, 2015; Ellya & Mira, 2020) in learning online and it is efficient to use. It can be suggested that learning mathematics through Kahoot enhances the potential and keenness. Students in this experiment were eager to learn and had a good time doing it. Students with different skills in mathematics, such as low, middle, and high skills, could enhance and improve their outcomes, and students who are low-skilled could achieve a 56.56% increase in their mathematics outcomes.

References

Abdullah, A.A., & Rochmadi, T. (2020). *Student Perceptions Towards Moodle and Kahoot Based E-Learning in Learning Mathematics. Proceeding International Conference on Science and Engineering, April*. Yogyakarta: ICSE.

Alqahtani, A.Y., & Rajkhan,. A.A. (2020). E-Learning Critical Success Factors during the COVID-19 Pandemic: A Comprehensive Analysis of E-Learning Managerial Perspectives. *Journal of Education Science*, *10*(9), 216. https://doi.org/10.3390/educsci10090216

p-ISSN 2549-8495, e-ISSN 2549-4937

Aras, N. G., & Çiftçi, B. (2021). Comparison of the effect of reinforcement with question-answer and kahoot method on the success and motivation levels of nursing students: A quasi-experimental review. *Nurse Education Today*, *102, 104930*. https://doi.org/10.1016/j.nedt.2021.104930

Bicen, H., & Kocakoyun, S. (2019). Perceptions of Students for Gamification Approach: Kahoot as a Case Study. *Journal of International Journal of Emerging Technologies in Learning*, *13*(2), 72-93. https://doi.org/10.3991/ijet.v13i02.7467

Castle, S. (2015). *The art of Blind Kahoot!ing*. Oslo: Kahoot!.

Chakrabartty. (2013). Best Split-Half and Maximum Reliability. *Journal of Research & Method in Education*, 3(1), 01-08.

Chang, H.M., & Kim, H.J. (2020). Predicting The Pass Probability Of Secondary School Students Taking Online Classes. *Journal of Computer and Education*, 164, 104110. https://doi.org/10.1016/j.compedu.2020.104110

Connolly, T. M., Boyle, E. A., MacArthur, E., Hainey, T., & Boyle, J. M. (2012). A Systematic Literature Review Of Empirical Evidence on Computer Games and Serious Games. *Journal of Computers and Education*, *59*(2), 661–686.

Iwamoto, D.H., Hargis, J., Taitano, E.J., & Vuong, K. (2017). Analyzing The Efficacy Of The Testing Effect Using Kahoot™ on Student Performance Turkish. *Online Journal Of Distance Education-Tojde*, *18*(2), 80-93.

Johns, K. (2015). Engaging and Assessing Students with Technology: A Review of Kahoot!. *Delta Kappa Gamma Bulletin*, *81*(4), 89-99.

Karadag, N., & Sahin, M. D. (2016). Analysis of the Difficulty and Discrimination Indices of Multiple-Choice Questions According to Cognitive Levels in an Open and Distance Learning Context. *Turkish Online Journal of Educational Technology-TOJET*, *15*(4), 16-24.

Kemdikbud. (2020). Surat edaran nomor 15 tahun 2020: Pedoman penyelenggaraan belajar dari rumah dalam masa darurat penyebaran corona virus disease (covid-19). Jakarta. Source: SIARAN PERS Nomor: 66 /Sipres/A6/III/2020.

Martín-Somer, M., Moreira, J., & Casado, C. (2021). Use of Kahoot! To Keep Students' Motivation During Online Classes in The Lockdown Period Caused by Covid 19. *Journal of Educational for Chemical Engineers, 36*, 154-159. https://doi.org/10.1016/j.ece.2021.05.005

Mohajan, H.K. (2017). Two criteria for good measurements in research: Validity and reliability. *Annals of Spiru Haret University Economics Series*, *17*(4), 59-82.

Nguyen, N. T., Tran, H. A., & Luu, L. N. (2017). Classroom Management: Difficulties Facing Fast-Track Teacher-Trainees in The Tutoring Program. *The English Teacher, 45*(2), 84-95.

Nurlaela, T., & Nopriana, T. (2022). Apakah Blended Learning dapat Meningkatkan Motivasi Belajar Matematika Siswa SMK di Masa Pandemi Covid 19?. *JNPM (Jurnal Nasional Pendidikan Matematika)*, *6*(1), 111-124. ttp://dx.doi.org/10.33603/jnpm.v6i1.6674

Öz, G. Ö., & Ordu, Y. (2021). The effects of web based education and Kahoot usage in evaluation of the knowledge and skills regarding intramuscular injection among nursing students. *Nurse Education Today, 103*, 104910. https://doi.org/10.1016/j.nedt.2021.104910

p-ISSN 2549-8495, e-ISSN 2549-4937

Prieto, M. C. (2019). Student Assessment of the Use of Kahoot in the Learning Process of Science and Mathematics. *Journal of Education Sciences*, *9*(1), 7-10. https://doi.org/10.3390/educsci9010055

Puspitasari, E., Mahfiana, A., & Pratolo, B. (2019). Students' Perception Toward Interactive Game to Facilitate Student's Achievement. *Proceedings of The 1st Steeem*, *1*(1), 296-303

Sangrà, A., Vlachopoulos, D., & Cabrera, N. (2012). Building an Inclusive Definition of E-Learning: An Approach to the Conceptual Framework. *International Review of Research in Open and Distance Learning*, *13*(2), 145-159. https://doi.org/10.19173/irrodl.v13i2.1161

Saprama, E. O. (2017). Analisis Soal Ujian Semester Genap Geografi Kelas XI di SMAN 1 Belitang Tahun 2017. *JPG (Jurnal Penelitian Geografi)*, *6*(1), 1-10.

Susilowati, E., & Azzasyofia, M. (2020). The Parents Stress Level in Facing Children Study from Home in the Early of Covid-19 Pandemic in Indonesia. *International Journal of Science and Society*, 2(3), 1-10. https://doi.org/10.54783/ijsoc.v2i3.117

Vanbecelaere, S. (2020). The Effects Of Two Digital Educational Games on Cognitive and Non-Cognitive Math and Reading Outcomes. *Journal of Computers and Education*, 143, 103680. https://doi.org/10.1016/j.compedu.2019.103680

Vusić, D., Bernik, A., & Geček, R. (2018). Instructional Design in Game Based Learning and Applications Used in Educational Systems. *Technical Journal*, *1*(2), 11–17. https://doi.org/10.31803/tg-20180312141348

Wang, A. I., & Lieberoth, A. (2016). The Effect Of Points and Audio on Concentration, Engagement, Enjoyment, Learning, Motivation, and Classroom Dynamics Using Kahoot!. *Conferences and Publishing International Limited*, *10*(1), 737–748.

Wang, A. I., Tahir, R. (2020). The Effect Of Using Kahoot! For Learning – A Literature Review. *Journal of Computer and Education*, *149*, 103818. https://doi.org/10.1016/j.compedu.2020.103818

Wulan, D. R., Rosita, C. D., & Nopriana, T. (2021). Kondisi psikologi siswa SMP dalam pembelajaran matematika pada masa pandemi covid-19. *JNPM (Jurnal Nasional Pendidikan Matematika)*, *5*(1), 51-64. http://dx.doi.org/10.33603/jnpm.v5i1.4392

p-ISSN 2549-8495, e-ISSN 2549-4937