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The Impact of Kahoot-Based Media on Learning Motivation in the Topic of Periodic Properties of Elements

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Abstract

The purpose of this study was to determine the implementation of Kahoot media on learning motivation on periodic properties of elements based on learning motivation indicators. This type of research is descriptive quantitative with purposive sampling technique on 36 students of class X-B SMAN Bogor Regency which was conducted in October 2024. The data collection technique used was a questionnaire. The results of this study indicate an increase in learning motivation with an average percentage value of 77.66 (good category). So it can be concluded that Kahoot media can increase students' learning motivation on Periodic Properties of Elements material based on learning motivation indicators.

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1. Introduction

The development of today's technology plays a very important role and influence in various fields such as aspects of life in the fields of economy, culture, politics, art, even in the field of education. Education cannot be separated from the development and changes in the curriculum that are tailored to the needs of the times (Kendek, 2023). At the high school education level in the learning curriculum, students are taught about various fields of science, one of which is chemistry. According to Muhsini (2024), currently, the implementation of the independent curriculum that is implemented brings changes in chemistry education with new teaching methods, thus allowing teachers to innovate in designing interactive and practical learning activities. The use of technology in learning is very useful in supporting quality learning. Books have begun to be replaced by technology, and learning content is widely available on the internet. However, the role of teachers in learning cannot be replaced (Akrim, 2018).

Realising that often students already have negative prejudices about chemistry, namely, difficult subjects that sometimes make students reluctant to study chemistry further (Sihran, 2007). Students find it difficult because most chemistry concepts are abstract and complex, so students need a deep understanding (Sariati et al., 2020). Some of the difficulties experienced by students in learning chemistry are caused by students who do not know how to understand concepts, have difficulty connecting concepts, and require the ability to utilise logic, mathematics, and language skills (Nababan & Krisen, 2018). In addition, there are other factors such as the way chemical concepts are presented in textbooks that are less interesting, the methods used by teachers are less effective and creative, and not infrequently also for reasons of difficulty finding the right learning media. Plus, the a lack of awareness or motivation from within students about the importance of chemistry lessons in everyday life. So these factors have an unfavourable impact on students' enthusiasm and interest in studying chemistry (Subagia, 2014). As a result, there is a decrease in students' interest in learning and motivation towards chemistry. This can be a challenge for teachers in schools in increasing student learning motivation (Harefa et al., 2020).

Therefore, in this digital era, we need teachers who are suitable for facing the challenges of technology in education that are increasingly rapid. One of the characteristics of teachers in the digital era is that the role of the teacher is not only as a facilitator, but also plays a role in terms of motivating and inspiring students. Learning tools are also needed to support interactive learning and the achievement of learning success. One of the learning tools that has an influence is learning media (Aziz et al., 2022). Teachers can use learning media in the form of collaborative platforms and digital communication tools to hold discussions and group activities that allow students to interact and learn collaboratively. The role of teachers in the digital era is not only as teachers but also as facilitators who help students to be able to utilise diverse learning resources, including in terms of using technology as a learning medium. Therefore, the ability of teachers in the digital era must be proficient in the use of technology compared to their students (Sharma, 2018).

Learning chemistry requires intense concentration because it requires skills that go beyond knowledge and require a fairly high level of understanding (Priliyanti et al., 2021). According to Nurrita (2018) the use of learning media can foster student interest in learning new things in the learning material delivered by the teacher so that it can be easily understood. Learning media is the media used in learning, which includes teacher aids in teaching as well as means of carrying messages from learning sources to recipients of learning messages (students) (Suryani et al. 2018). Interesting learning media can increase students' attention and tendency to learn (Launin et al., 2022). One of the learning media can be utilised through interactive games. Interactive games are games that involve many people in the game process. These games aim to stimulate brain activity. Brain performance is related to the creation, production, and distribution of entertaining, agile, and educational content (Sudarsono, 2021). Educators can use various online applications that have developed a lot to support the achievement of the learning process objectives (Mustikawati, 2019). One of them is by using the Kahoot online application.

Kahoot can be a learning resource and learning media that can meet the needs of the digital generation. Kahoot can also increase interest and support the learning style of the digital generation (Mustikawati, 2019). Kahoot can be a shared learning media in the classroom with the help of laptops, devices, and projectors. Kahoot is an educational game that is free of charge and can be accessed by anyone, especially educators and students, with the prerequisite of an internet connection (Irwan et al., 2019). Kahoot requires an internet connection because it can only be played online and can be accessed at www.kahoot.com by connecting to the internet. Kahoot is a website on the internet that can bring a lively and fun quiz atmosphere into the classroom (Uno, 2014). In line with Uno's (2004) statement, one of the advantages of Kahoot is to increase students' learning motivation. The most interesting side during the implementation of Kahoot is that for each question that has been answered, it will be shown on the computer screen/projector and immediately displays the correct answer, the wrong answer and the score of each participant so that students can know the wrong or correct answer given and compete in answering the next question.

Motivation can be defined as a person's strength that can raise the level of willingness to carry out activities. Learning motivation is the overall driving force within students that causes learning (Winkel, 2004). In line with the statement (Herwati et al., 2023), learning motivation is everything that encourages

students to learn well. Motivation is the basis for students to obtain maximum learning outcomes, where further learning outcomes will be used as the basis for determining the achievement of expected competencies (Rahman, 2021). However, in reality, each student has a different level of learning motivation, so that learning does not run effectively and becomes a problem for achieving school learning goals (Rosanna et al., 2022). Motivation has many roles in the learning process, starting from clarifying learning objectives, which can give birth to achievement, and students can more easily select directions to achieve a goal (Rahman, 2021).

According to Sardiman (1990), learning motivation that comes from within students (intrinsic) is persistent in doing tasks, resilient in facing difficulties, and shows interest in various problems, such as finding a way out of a problem. Based on research conducted by Uno (2014) several indicators of learning motivation include: (1) the existence of desire and desire to succeed; (2) the existence of encouragement and needs in learning; (3) the existence of future hopes and ideals; (4) the existence of appreciation in learning; (5) the existence of interesting activities in learning; (6) the existence of a conducive learning situation, allowing students to learn well (Uno, 2014). In this study, we will measure the increase in student motivation after applying Kahoot learning media in chemistry learning.

With the help of Kahoot media, educators can create more creative and innovative learning so as to increase student learning motivation in chemistry lessons. Following the statement of Azzachra and Hidayah (2024), learning motivation is one of the factors of student success in the educational process. In line with Daryanes and Ririen (2020), Kahoot is an innovative and creative learning evaluation media, as well as educational games that can increase students' attention, motivation, involvement, and enjoyment. In the implementation of learning using Kahoot media, teachers can provide material through questions in a quiz that ask for student responses to answer and are given a score. The scores/rankings obtained will be displayed on the screen in front of the class. Based on my observation in class, students are more motivated to determine the right answer so as to produce a high score.

Similar research has been conducted by Andaresta and Bahriah (2024) regarding the Implementation of Kahoot Media Based on Games-Based Learning on Student Learning Outcomes on Electron Configuration. Material from this study was able to significantly improve student cognitive learning outcomes. This is indicated by the overall average value of students of 78.83 included in the Good category, with a vulnerable 61-80% and the number of students who pass the KKM as much as 86%. Furthermore, research conducted by Artika et al., (2024) about Kahoot: Alternative Learning Media on Colloidal Material explained that the percentage of students' perceptions of the use of kahoot was in the "Good" category with a value of 79%, because learning with the help of kahoot media can help students understand the material being studied. In addition, research conducted by Rozanah et al. (2023) found that Kahoot! is more effective if used as an evaluation media at the end of learning, not during the learning process.

Based on what has been presented, the use of Kahoot learning media can increase student motivation. The purpose of this study is to determine the implementation of Kahoot media on learning motivation for periodic properties of elements based on learning motivation indicators.

2. Materials and Methods

The research method used in this research is quantitative descriptive research. Quantitative descriptive research is a method that aims to make a picture or description of a situation objectively using numbers, starting from data collection, interpretation of the data and appearance and results (Arikunto, 2013). The research was conducted at SMAN Bogor Regency in October of the 2024/2025 academic year in the chemistry subject of Periodic Properties of Elements. The subjects of this study were X-B class students, totalling 36 students, consisting of 20 female students and 16 male students. The instrument used is a questionnaire with 30 lists of statements, intended to observe students' responses to chemistry learning with the help of Kahoot. In line with Darwin et al. (2021), a questionnaire is a way of collecting data by providing a list of questions or statements in the form of a questionnaire to be filled in by respondents according to research needs.

Figure 1. Implementation of learning activities with Kahoot

The learning process is carried out in the classroom and lasts for 3 meetings with a time allocation of 2JP x 40 Minutes. In the first meeting, the teacher explains the historical material of the periodic system of elements so that students understand the development of the periodic system of elements starting from the triad model by Dobereiner to the modern periodic system of elements that has been refined by Henry Moseley. Furthermore, the second meeting of elemental properties material includes the definition of atomic radius, ionisation energy, electron affinity, electronegativity of metal properties, as well as the boiling point and melting point of an element. In the third meeting, learning evaluation activities were carried out in groups regarding the periodic nature of elements with Kahoot media. Learning evaluation is carried out to determine the extent to which learning has gone so that it can make assessments and improvements, so that the results are optimal (Soulisa et al., 2022). From classroom observations, students are more active in interacting and answering when using Kahoot as an interesting learning media, under Uno's (2014) statement regarding learning motivation indicators, namely the existence of interesting activities in learning.

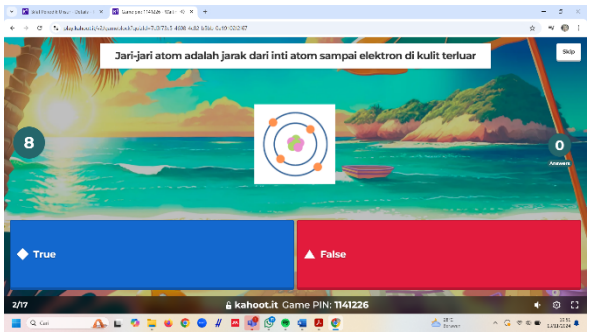

Figure 2. Displayed model question with correct wrong answer

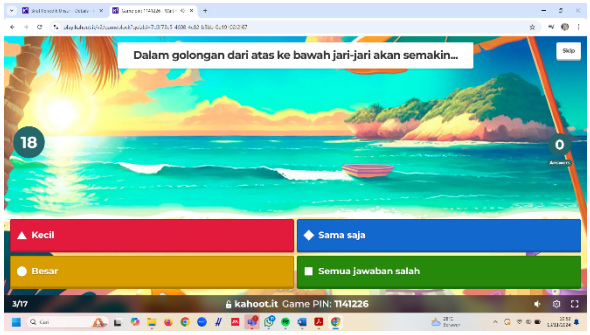

Figure 3. Displayed a question model with multiple choices

During the implementation, students were formed into 5 groups of 7 members. Students who are members of the group actively discuss and collaborate; they look enthusiastic and competitive in answering 17 questions precisely and quickly. According to Uno (2014), related to the existence of encouragement and needs in learning, namely in the Kahoot game, students try to get the best final score.

Each question displayed has a different time and difficulty level, so students are required to be careful in understanding the question well. The questions are arranged randomly based on the material that has been explained by the teacher so that students focus on remembering the learning in the previous meeting. After all the questions were answered, it was shown that group 1 won the game this time, with 14 correct answers and a score of 13,078.

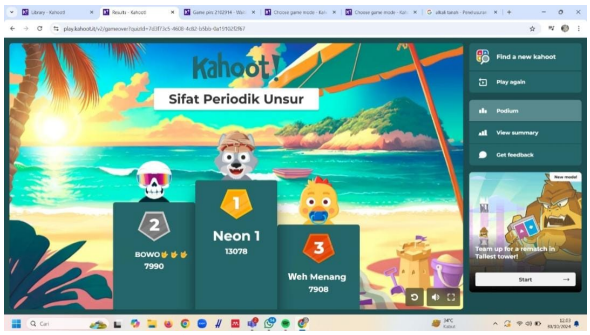

Figure 4. Display the three groups with the best scores

The data was collected using a questionnaire consisting of 30 statements arranged on a Likert scale. The questionnaire was used to measure students' responses to the implementation of Kahoot media in learning the chemistry of Periodic Properties of Elements. The indicators measured in this study are learning motivation indicators modified from Uno (2014) which consist of: (1) the existence of desire and desire to succeed, (2) the existence of encouragement and needs in learning, (3) the existence of future hopes and ideals, (4) the existence of rewards in learning, (5) the existence of interesting activities in learning, and (6) the existence of a conducive learning situation, allowing students to learn well.

The lattice of questionnaire instruments can be seen in the table below.

Table 1. Questionnaire instrument lattice

No	Indicator	No. Item		Number of Items
		Positive	Negative	
1	Desire and desire to succeed	1, 2, 3, 4, 5	-	5
2	The existence of encouragement and needs in learning	6, 8, 9, 10	7	5
3	The existence of future hopes and aspirations	11, 12, 14, 15	13	5
4	The existence of rewards in learning	16, 17, 18, 19	20	5
5	The existence of interesting activities in learning	21, 22, 23, 24	25	5
6	The existence of a conducive learning situation	26, 27, 28, 29	30	5
	Total Questions			30

The data obtained was analysed descriptively and quantitatively by giving scores in the table below.

Table 2. Likert Scale

Answer choices	Positive Score	Negative Score
Strongly Agree	4	1

Agree	3	2
Not Agree	2	3
Strongly Not Agree	1	4

Percentaged into the following formula:

$$P = \frac{F}{n} \times 100\%$$

Description:
P: percentage amount
F: frequency of answers
n: total number of respondents (Sulistyawati & Trinuryono, 2022)

The data obtained from the calculation is interpreted into five categories of learning motivation according to Arikunto (2016), as shown in the table below.

Table 3. Percentage of learning motivation

No	Percentage Range Learning motivation	Category
1	80 ≤ P ≤ 100	Very Good
2	65 ≤ P ≤ 79,99	Good
3	55 ≤ P ≤ 64,99	Enough
4	40 ≤ P ≤ 54,99	Less
5	0 ≤ P ≤ 39,99	Very less

(Arikunto, 2016)

3. Results and Discussions

The data on the results of the overall student motivation questionnaire is shown in Figure.5 below.

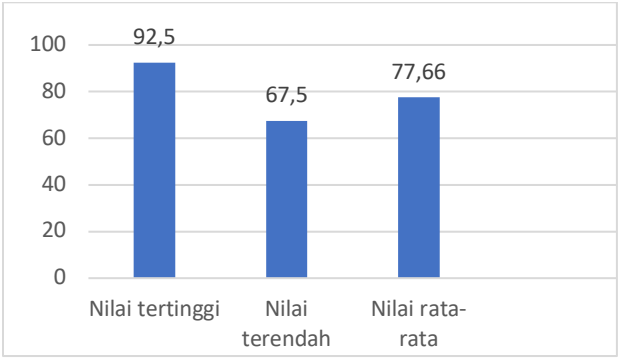

Figure 5. Data from the overall student motivation questionnaire results

Based on the results of research that has been done by implementing Kahoot media in Periodic Properties of elements, the average score of 36 students of class X-B is 77.66, which is included in the good category, with the highest score of 92.5 and the lowest score of 67.5. This shows that Kahoot media used in learning can increase learning motivation for students in the classroom. The results of this study are also in line with research conducted by Gymnastiar (2022) that by implementing the Kahoot application

can maintain and also increase the motivation and continuous interest of student learning, and also make it easier for students to understand every content of the material delivered by the teacher so that the realization of an atmosphere and situation that is very much liked by students, and more interesting, also not boring. Putri et al. (2022) also said that learning media is effective enough to increase student learning motivation in the chemistry learning process, so that students do not feel bored.

In addition to the overall data, researchers also examine student learning motivation for each indicator. Indicators were measured from 6 indicators modified from Uno (2014). The following is the data on the results of learning motivation for each indicator.

Table 4. Analysis of student learning motivation on each indicator

No	Indicator	Average	Category
1	Desire and desire to succeed	77,64	Good
2	The existence of encouragement and needs in learning	77,78	Good
3	The existence of future hopes and aspirations	74,58	Good
4	The existence of rewards in learning	80,28	Very Good
5	The existence of interesting activities in learning	79,31	Good
6	The existence of a conducive learning situation	76,39	Good

Table 4 shows that overall, students have good learning motivation in indicator 1, as seen from the resulting percentage. This is based on Arsyad (2011) that the use of learning media in the teaching and learning process can arouse new desires and interests, arouse motivation and stimulation while learning and have a psychological influence on students. With Kahoot media, students feel that they want to succeed because Kahoot media emphasises a learning style that involves an active role relationship of student participation with their friends competitively against the learning they are learning (Harlina & Ahmad, 2017). Based on the score of 13,708 on Kahoot media, it also shows that students have the desire and desire to succeed by answering 14 out of 17 questions on Kahoot.

In indicator 2 regarding encouragement and needs in learning, it is shown with a percentage of 77.78, which is included in the good category. The existence of encouragement and the needs for students are indicated by changes in behaviour to be more enthusiastic and enthusiastic in answering questions when using Kahoot media. This is explained by Rahman (2021), motivation is an encouragement that can lead to certain behaviours that are directed towards achieving a certain goal. In line with Sulistiyawati et al. (2021), it has a positive effect on student interest in learning, where there is an increase in student independence and motivation, students become more active in learning, which means students have a learning motivation after using Kahoot media. In addition, Kahoot's interactive learning motivates students to master the subject matter and develop critical thinking skills (Suryawan & Febrian, 2023).

In indicator 3, there is a percentage of 74.58, which is in the good category, indicating that students have expectations in learning chemistry with Kahoot media. This statement is supported by Prasetiani and Sukirman (2024) that students can better understand and remember material, increase productivity, and effectiveness in learning by using Kahoot, which can provide good value expectations in chemistry learning. In addition, the teacher's skill in providing hope or sensitivity is all responses from the teacher's behaviour modification to student behaviour, which aims to provide feedback for students on their actions as an encouragement or correction (Wina, 2006).

In indicator 4, the results of learning motivation were obtained in a very good category with a percentage of 80.28, which means that the existence of awards can increase student learning motivation. In the group with the best score, the teacher also gave the fastest responding group a certificate as a sign that the group should be appreciated and become a motivation for friends from other groups. As explained by Marno and Idris (2014) that the purpose of giving rewards can increase students' attention in learning, arouse, maintain and increase student learning motivation. This is because rewards have the potential to be a strong driver for students to be more interested and motivated in certain learning areas when they are rewarded (Yuliana & Ummya, 2023).

Furthermore, indicator 5 is shown in the good category, which means that Kahoot has interesting activities in the learning process. In line with research conducted by Rozanah et al. (2023) also revealed that Kahoot can increase enthusiasm and interest in learning and affect students' emotional levels because it has many interesting features. In line with this, Ibrahim et al. (2020) the use of interactive media can increase the learning motivation of students, especially in mastering the material of the periodic system of elements (Ibrahim et al., 2020). Rafinis (2018) revealed that Kahoot is an interesting media that can make the learning atmosphere more fun and can foster student enthusiasm in participating in learning and not cause boredom.

Indicator 6 is categorised as good because, based on the resulting percentage of 76.39, it shows that the creation of a conducive learning situation with the use of Kahoot media in the classroom and a pleasant learning atmosphere. This is shown when students focus on discussing with their group mates, and each student plays an active role in expressing opinions, uniting opinions so that they can measure the extent of student understanding. In addition, this discussion and group method is considered to be able to train students to be able to express opinions and train students to be able to respect the opinions of others. It is realised that a conducive class can prevent students from boredom, boredom and psychological fatigue, while on the other hand, a conducive class will be able to foster interest, motivation and learning endurance (Arianti, 2017).

Then the researchers correlated it with gender, so the following student learning outcomes were obtained.

Table 5. Student motivation data by gender

	Gender

	Man	Woman
Number of Students	16	20
Highest Score	111	109
Average	93,88	92,65
Category	Very Good	Very Good

Based on the table above, the average learning motivation of male and female students is obtained in the very good category. This means that students have high learning motivation in learning chemistry using Kahoot media. According to Hoang (2008) that gender indirectly affects the formation of attitudes and learning motivation. However, the results of the data do not show significant differences. Positive learning experiences are very important in creating a conducive learning environment and motivating students to continue learning (Nyroos et al., 2022). Learning with Kahoot media allows students to actively participate in interactive quizzes, get immediate feedback, and experience a more fun and competitive learning atmosphere. The results were not much different; both had a very good increase in learning motivation, with an average of 93.88 for male students and 92.65 for female students. The positive impact of using games in learning can create a fun and entertaining learning atmosphere and provide exercises for problem-solving and logic (Setiawan et al., 2019). In addition, Kahoot games have challenges and scores that can be achieved according to students' abilities, thus helping the learning process to be more effective and efficient.

5. Conclusions

The implementation of Kahoot media in chemistry learning on Periodic Properties of Elements can increase student learning motivation with an average percentage of 77.66, which is a good category. Based on the indicators, different percentages are obtained, namely: (1) the existence of desire and desire to succeed (77.64), (2) the existence of encouragement and needs in learning (77.78); (3) the existence of future hopes and ideals (74.58); (4) the existence of appreciation in learning (80.28); (5) the existence of interesting activities in learning (79.31); (6) the existence of a conducive learning situation (76.31). Based on gender, the results also show that Kahoot media can increase learning motivation with a percentage in the male gender of 93.88 and the female gender with a percentage of 92.65, which is included in the very good category. So it can be concluded that using Kahoot media, students can increase learning motivation, and students find it easier to understand all the content of the material delivered by the teacher in a pleasant learning atmosphere with interesting activities that contribute positively to their motivation in learning chemistry on the Periodic Properties of Elements material.

References

Akrim. (2018). Media Learning in Digital Era. *Proceedings of 5th International Conference Community Development), 231*, 458-460.

Andaresta, S. dan Bahriah E.S. (2024). Implementasi Media Kahoot Berbasis Games Based Learning Terhadap Hasil Belajar Siswa Pada Materi Konfigurasi Elektron. *Seminar Nasioanl FITK UIN Jakarta, 1*(1)

Arianti. (2017). Urgensi Lingkungan Belajar yang Kondusif dalam Mendorong Siswa Belajar Aktif. *DIDAKTIKA Jurnal Kependidikan, 11*(1), 41–62

Arikunto, S. (2013). Prosedur Penelitian Suatu Pendekatan Praktik. Jakarta: PT. Rineka Cipta.

Azzachra & Hidayah. (2024) LAVOISIER: *Chemistry Education Journal 3*(2), 28–43

Darwin, M., Mamondol, M.R., Sormin, S.A., Nurhayati, Y., Tambunan, H., Sylvia, D., Adyana, M.D.M., Prasetiyo, B., Vianitati, P., Gebang., A.A. 2021. Metode penelitian Pendekatan Kuantitatif. Jawa Barat: CV Media Sains Indonesia

Daryanes, F. dan, & Ririen, D. (2020). Efektivitas Penggunaan Aplikasi Kahoot sebagai Alat Evaluasi pada Mahasiswa. *Journal of Natural Science and Integration, 3*(2), 172

Gymnastiar, I.A. (2022). Implementasi Aplikasi Kahoot sebagai Media Pembelajaran Berbasis Gamifikasi Digital dalam Peningkatan Motivasi Belajar Siswa di SMA Pasundan Banjaran. *SOSIO RELIGI: Jurnal Kajian Pendidikan Umum, 20*(1), 1–8

Harefa, N., Sadarman Tafonao, G., Hidar S., & Kunci, K. (2020). Analisis Minat Belajar Kimia Siswa Melalui Pembelajaran Berbasis Multimedia. *Jurnal Kajian, Penelitian Dan Pengembangan Kependidikan, 11*(2), 81-86.

Herwati, Arifin, M. Miftahul., Rahayu, Tri. Waritsman, Arsyil., Solang, Deetje. J., Zulaichoh, S., Aniyati, Kholis., Haryanto, T., Putri, S. S., Kristanto, B. (2023). Motivasi dalam Pendidikan-Konsep-Teori-Aplikasi. Malang: Literasi Nusantara Abadi Grup.

Hoang, T. N. (2008). The Effect of Grade Level, Gender, and Ethnicity on Attitute and Learning Environment in Accounting Ni High School. *International Electronic Journal of Accountuing Education, 3*(1), 47–59

Ibrahim, A. A., Gunawan, & Zulkarnain, M. R. (2020). Pengembangan media pembelajaran kimia berbasis multimedia pada materi sistem periodik unsur di smk bina banua banjarmasin. *LENTERA Jurnal Ilmiah Kependidikan, 15*(2), 1–14.

Irwan, Zaky Farid Luthfi, & Atri Waldi. (2019). Efektifitas Penggunaan Kahoot! untuk Meningkatkan Hasil Belajar Siswa. *PEDAGOGIA: Jurnal Pendidikan, 8 (1),* 96-97.

Launin, Shofiya, W.Nugroho., & Angga, S. (2022). Pengaruh Media Game Online Wordwall Untuk Meningkatkan Minat Belajar Siswa Kelas IV. *Jurnal Pendidikan dan Ilmu Sosial, 1*(3), 216-223.

Mustikawati, E., & Fenny. (2019). Fungsi Aplikasi Kahoot sebagai Media Pembelajaran Bahasa Indonesia. 99-104.

Nababan, K., Hastuti, B., & Indriyanti, N. Y. (2019). Blended learning in high school chemistry to enhance students' metacognitive skills and attitudes towards chemistry: A need analysis. *AIP Conference Proceedings*, *2194*(1).

Nurrita, Teni. (2018). Pengembangan Media Pembelajaran Untuk Meningkatkan Hasil Belajar Siswa. *Jurnal Misykat, 3*(1), 171-187.

Nyroos, M., Korhonen, J., & Mononen, R. (2022). Editorial: Cognitive and affective factors in relations to learning. Frontiers in Psychology, 13.

Permana, E. P. (2016). "Penerapan Metode Pembelajaran Kooperatif Numbered Heads Together (NHT) Untuk Meningkatkan Hasil Belajar dan Berpikir Kritis Siswa Pada Mata Pelajaran IPS SD". *Jurnal Pendidikan Dasar Nusantara, 1*(2).

Priliyanti, A., Muderawan, I.W. & Maryam, S. (2021). Analisis Kesulitan Belajar Siswa Dalam Mempelajari Kimia Kelas Xi. J. Pendidik. Kim. Undiksha.

Putri, Taufik & Qurniati. (2022). Pengembangan media pembelajaran kimia berbasis video animasi untuk meningkatkan motivasi belajar siswa sman 1 wanasaba. *SPIN: Jurnal Kimia & Pendidikan Kimia, 4*(1), 58-66

Rafinis. (2018). Pemanfaatan platform Kahoot! sebagai media pembelajaran interaktif. *ETech: Jurnal Ilmiah Teknologi Pendidikan, 6*(2), 1-9.

Rahman, Sunarti. (2021). Pentingnya Motivasi Belajar Dalam Meningkatkan Hasil Belajar. *Prosiding Seminar Nasional Pendidikan Dasar,* 289-302.

Rosanna, D. L., Suciana, D., Hajijah, A. (2022). The Effect of Rewards and Punishment on Student Learning Motivation on Stoichiometry Material. *Lavoisier: Chemistry Education Journal 1*(2),1–9.

Sariati, Suardana, Wiratini. (2020). Analisis Kesulitan Belajar Kimia Siswa Kelas Xi Pada Materi Larutan Penyangga. *Jurnal Ilmiah Pendidikan dan Pembelajaran, 4*(1), 86-97

Setiawan, A., Wigati, S., & Sulistyaningsih, D. (2019). Implementasi media game edukasi quizizz untuk meningkatkan hasil belajar matematika materi sistem persamaan linear tiga variabel kelas x ipa 7 sma negeri 15 semarang tahun pelajaran 2019/2020. EDUSAINTEK, 3

Sharma, Manisha. (2018). Teacher in a Digital Era. *Global Journal of Computer Science and Tecnology, 17(3),* 11-14

Soulisa, I., Supratman, M., Rosfiani, O., Renaldi, R., Sopiah., Utomo, W.T., Hermawan, C.M., Ariati, C., Riyanti, A., Tauran, S.F., Irwanto., Astiwijaya, N., Yenni., & Sutisnawati, A. 2022. Evaluasi Pembelajaran. Bandung: Widina Bhakti Persada. 236.

Subagia, I. W. (2014). Paradigma Baru Pembelajaran Kimia SMA. *Seminar Nasional FMIPA UNDIKSHA IV*, 152–163.

Sudarsono, S. & Mulyani. (2021). Pengembangan Media Pembelajaran Game Interaktif Berbasis Aplikasi Web Wordwall Pada Pelajaran Matematika Materi Bilangan Ganjil Genap Kelas II SD.

Sulistyawati, W., & Trinuryono, S. (2022). Analisis (Deskriptif Kuantitatif) Motivasi Belajar Siswa Dengan Model Blended Learning Di Masa Pandemi Covid19. 69–73.

Suryani, N., Setiawan, A., & Putria, A. (2018). Metode Pembelajaran Inovatif dan Pengembangannya. Bandung: Rosda Karya.

Suryawan, R. F., & Febrian, W. D. (2023). Socialization of Prevention Patterns of Wild Racing and Suppressing the Number of Traffic Accidents. *Asian Journal of Community Services, 2*(11), 945-954.

Uno, H. B. (2014). Teori Motivasi dan Pengukurannya: Analisis di Bidang Pendidikan. Bumi Aksara

Wina, Sanjaya. 2006. Strategi Pembelajaran. Jakarta: Kencana Prenada Media Group

Winkel, W. S. (2004). Psikologi Pendidikan dan Evaluasi Belajar. Jakarta: PT. Gramedia Pustaka Utama.

Yuliana, & Ummya, F. (2023). Penerapan Reward Dan Punishment Dalam Meningkatkan Motivasi Belajar Siswa Kelas VIII E SMP Islam Integral Luqman Al-Hakim Batam. *Jurnal AS-SAID, 3*(1), 62–70.