

THE EFFECT OF THE "HY-BON HYDROCARBON" EDUGAME MEDIA ON HYDROCARBON DERIVATIVE MATERIALS ON THE LEARNING OUTCOMES OF STUDENTS IN CLASS 12 MIPA 7 SMA NEGERI 3 SIDOARJO

Deni Ainur Rokhim^{1,3*}, Dede Yayah R³, Shabrina Nabilah², Fathin Salsabila Alfarisi²

1 Chemistry, SMAN 3 Sidoarjo

2 Chemistry Education, Faculty of Mathematics and Natural Sciences, Surabaya State University

3 Chemistry Education, FMIPA, State University of Malang

Email: deniainurrokhim@gmail.com, shabrinanabilah24@gmail.com

Abstract

This study aims to determine the effect of edugame media "hy-bon hydrocarbons" on hydrocarbon derivatives on the learning outcomes of students in grade 12 MIPA 7 SMA Negeri 3 Sidoarjo. Quantitative data collection with 20 students as a sample who answered the pretest and posttest questions. The results showed that the "hy-bon hydrocarbon" educational media on hydrocarbon derivative materials had an effect on student learning outcomes. This is evidenced by the results of data processing using the normality test and t-test which shows the influence of the "hy-bon hydrocarbon" edugame media on student learning outcomes. And indicated by the value of the t count is greater than the t table. That is $8.608 > 2.037$. So H_0 is rejected and H_a is accepted

Keywords: *edugame, hy-bon hydrocarbons, hydrocarbon derivatives, learning outcomes*

Received: December 2021, Revised: March 2021, Published: June 2022

INTRODUCTION

Chemistry is one of the subjects in the natural sciences in high school or its equivalent. Chemistry is a science that studies the structure of matter or the composition of a substance, its properties, changes in its composition, the mechanism of change, and the energy that accompanies changes in substances. Chemistry subjects are still considered difficult science to learn. One of the reasons is the chemical material which is mostly abstract (Lafarge et al., 2014). It is not easy to study Chemistry at school by only providing an outline theory. Some basic concepts of chemistry must be mastered before moving to the next level. One of these basic concepts is learning about the naming of hydrocarbon derivative compounds (Dwiningsih et al., 2018) derivatives of hydrocarbon compounds including learning topics that are full of concepts and are abstracts.

Hydrocarbon derivatives are one of the chemicals that require strong memory (Syafriani et al., 2017) nomenclature material for hydrocarbon compounds requires an in-depth understanding that requires students to be more focused on following the learning process, considering that in this lesson most of the material is abstract such as the shape of the structure and the name of the structure. So that the concepts explained can be understood by students well, in the learning process can use a learning media.

This learning media can help students understand the concept. Because each way of presenting the concept will determine the understanding of students. When learning activities feel passive, students will also participate in learning activities with a sense of curiosity, without asking questions, and without any interest in the results of the learning. Meanwhile, when learning is active, students will be more interested and ask more questions such as needing information to solve problems or finding ways to do assignments by being directly involved in learning activities (Sadiman, 2006).

Learning media has a main function as a teaching aid that can affect the atmosphere in learning (Nurwidayanti & Mukminan, 2018) learning media can arouse students' motivation and interest in learning, improve understanding, present interesting and reliable data, facilitate data interpretation and condense information. in the journal (Priatmoko et al., 2012). Explaining learning media can represent something that the teacher cannot convey through words or sentences. Current learning media should take advantage of technological developments in the learning process. So that teachers and students develop with the times. Games or games are very popular with students today so game-based learning media can be used as a teacher's tool in delivering material in more detail and with more interest. Games can involve students in interactive and active learning, create a sense of joy and motivate students in learning (Yolanda & Iswendy, 2019).

The above statement is also supported by Miranda et al (2012) who say that other influences that support increasing learning achievement are due to the monopoly game as a medium *chemo-edutainment* can relieve student boredom. The loss of student boredom because the game of monopoly can create a playful atmosphere that makes the atmosphere fun. The loss of boredom in students is marked by changes in student behavior at each stage of learning activities (Miranda et al., 2012).

Learning media in the form of games that can be used on chemical derivatives, one of which is Hy-Bon Hydrocarbons. Hy-Bon Hydrocarbons is a pou game that has been modified in such a way that it contains material and questions that aim to strengthen the concept of nomenclature of hydrocarbon derivatives. Hy-Bon Hydrocarbons can attract students' interest because it can create a fun and relaxed learning atmosphere.

So, it is very potential to implement "hy-bon" hydrocarbon edugame media as learning media in the classroom. The purpose of this study was to determine the effect of hydrocarbon hy-bon media on hydrocarbon-derived materials on learning outcomes, with the hope that the level of learning outcomes obtained can make this hydrocarbon hy-bon media a learning medium in subsequent chemistry.

RESEARCH METHODS

This research was conducted at SMA Negeri 3 Sidoarjo, Sidoarjo Regency, East Java Province. The subjects of this study were students of class 12 MIPA 7 from the same school who had studied hydrocarbon derivatives. The method used in this research is quantitative research with a quasi-experimental design with a pretest and posttest one-group design to determine the effect of edu-game media on student learning outcomes. This research method uses quantitative methods (Sugiyono, 2013). The research population was students of class 12 MIPA 7.

Quantitative data were obtained in the form of pretest and posttest scores where the pretest and posttest questions given were based on the Minimum Competency Assessment (AKM) with the types of short descriptions, matchmaking, and more than one true-false. The pretest and posttest value data were then processed using normality test data analysis techniques, an n-gain test, and one-sample t-test using the SPSS program. The gain test was used to measure the increase in student learning outcomes. Calculation of n-gain is obtained from the pretest scores (before being given Edu-game media) and posttest (after being given edu-game media) to each student. The n-gain formula is as follows:

$$N - gain = \frac{\text{Nilai posttest} - \text{Nilai pretest}}{\text{Nilai maksimal} - \text{Nilai pretest}}$$

The criteria for the n-gain level obtained can be known by table 1. After determining the n-gain, then the normality test and one-sample t-test. A normality test is used to test whether the research data is normally distributed or not. After the data is categorized as normal, then perform a one-sample t-test to compare the average results before being given the edu-game media and after being given the edugame, the researchers formulate the research hypothesis:

1. Ha: there is an effect of Hy-Bon Hydrocarbon edugame media on student learning outcomes
2. Ho: there is no effect of Hy-Bon Hydrocarbon edugame media on student learning outcomes.

Table 1. N-gain Level Criteria

No	Value Range	Category
1	G 0.7	Tall
2	0.3 G < 0.7	Currently
3	G < 0.3	Low

In this study, the effect of Hy-Bon Hydrocarbon edugame media on hydrocarbon-derived materials on the learning outcomes of 12 MIPA 7 students, to measure the t-count value using SPSS software based on the t-value.

1. If t count > t table, then Ha is accepted
2. If t count < t table, then Ha is rejected

RESULTS AND DISCUSSION

Hy-Bon Hydrocarbons is a pou game that has been modified in such a way that it contains material and questions that aim to strengthen the concept of nomenclature of hydrocarbon derivatives. Hy-Bon Hydrocarbons can attract students' interest because it can create a fun and relaxed learning atmosphere.

The effect of this learning media is seen by increasing the ability of students understanding of hydrocarbon derivatives. Students are grouped into 3 categories, namely high, medium, and low. Pretest and posttest score data were obtained from students who had worked on the questions and calculated N-Gain. According to Sugiyono, N-Gain is a comparison of the Gain scores obtained by students with the highest possible Gain scores obtained by students. The data from the grouping of students through the pretest and posttest can be seen as follows:

Table 2. Pretest and Posttest Results

PRE TEST	POST TEST	N-GAIN
40	90	0.83
30	90	0.86
60	90	0.75
30	90	0.86
40	80	0.67
70	90	0.67
50	90	0.8
40	90	0.83
40	90	0.83
20	80	0.75
50	90	0.8
40	90	0.83
20	60	0.5
60	80	0.5
20	90	0.88
20	90	0.88
20	60	0.5
70	90	0.67
60	90	0.75
30	80	0.71

It can be seen from the table above, students experienced an increase before and after using this "hy-bon hydrocarbon" learning media. If it is matched with the scoring category based on the N-Gain value range, all categories of students' abilities have increased. This is happening because students are more active and motivated when using learning media "hy-bon hydrocarbons", to improve student learning outcomes. The combination of images with colors in this educational game makes students more interested in using it. The results of this study are in line with the research belonging to Setiyani & Santi (2019), that the average increasing pretest and posttest on the use of learning with the help of Macromedia flash media during the learning process so that students are more active and enthusiastic.

Table 3. SPSS Test of Normality Output

	Shapiro-Wilk		
	Statistics	df	Sig.
nain	.847	20	.005

Based on the output of the Test of Normality using SPSS, the significance value of Saphiro Wik is 0.05. From the provisions of the normality test, if the data has a significance value of 0.05, it can be said that

the data is normal. This test uses Shapiro-Wilk because the sample used is less than 30. To strengthen the results of the analysis, also consider the following normal distribution plots

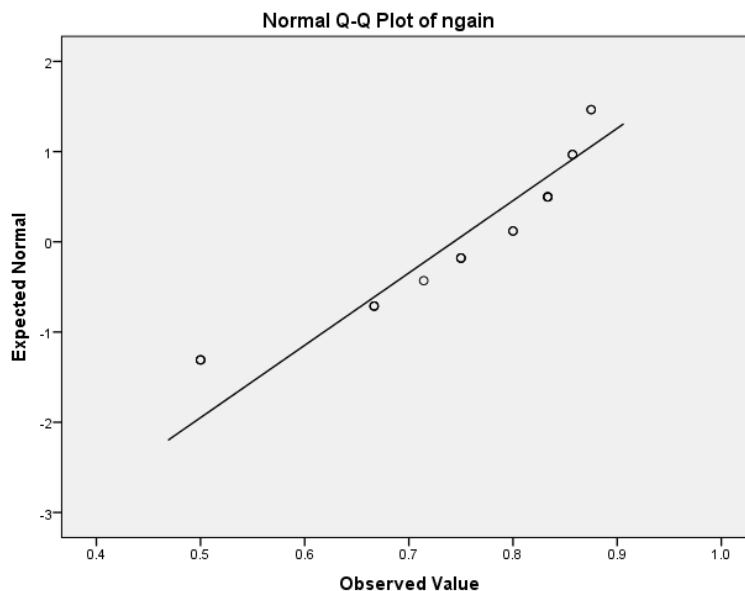


Figure 1. QQ plots

From the results of the QQ plots, it can be seen that the distribution of the students' final score data high, medium, and low ability are normally distributed. There is an increase in students' understanding of hydrocarbon derivatives before and after using the "hy-bon hydrocarbon" media. Increased student attention helps the learning process in each ability category, so that the concepts of relations and functions can be understood well. Results This is in line with Mananda's research (2017) that learning using the "hy-bon hydrocarbon" media is one solution to overcome the boredom of students with learning chemistry and overcome their low understanding of chemical concepts in students (Irma Mananda, 2017).

After being tested for normality, then a t-test will be carried out to find out the truth or falsity of the null hypothesis (Ho). The t-test was carried out based on the students' average pretest and posttest scores

1. Ha: t count > t table; there is an influence
2. Ho: t count < t table; no influence.

Table 4. SPSS One-Sample Test Output

Test Value = 0						
95% Confidence Interval of the Difference						
	t	df	Sig. (2-tailed)	Mean Difference	Lower	Upper
average	24,594	19	.000	62,750	57.41	68.09

Based on the table of the results of the calculation using the SPSS program, the t count is 24,594. When compared with t table, t count > t table (24,594 > 1,708). So it can be said that ha is accepted, that is, there is an influence of edugame hy-bon hydrocarbon media on student learning outcomes, while based on the significance: (a) If the significance is > 0.05, then Ho is accepted and Ha is rejected. (b) If the significance is < 0.05, then Ho is rejected and Ha is accepted. From the SPSS output, the t count (t) is 24,594 and the significance (Sig.) is 0,000 and the t table is 1,708.

Because the value of t count > t table (8.608 > 2.037) and significance < 0.05, then Ho is rejected and Ha is accepted. So it can be concluded that the use of learning media affects student learning outcomes. This is in line with the research of Rusly Hidayah, et al. (2017) entitled the game of Chemistry Box Katik as a learning medium on the material of the periodic system of elements, namely by using this media, student learning outcomes increase (Hidayah et al., 2017).

Thus, learning media is very helpful in the learning process of students. Tri Yulianti, et al (2018) also confirms that teachers measure the success of the learning media used by giving posttests individually or in groups (Yulianti et al., 2018). With the posttest, it can find out the increase in students' knowledge about the learning material presented. The value of students after the teacher used learning media in delivering

learning material on average there was an increase, although not all students' scores increased. This is also supported by Helni et al (2013) that there are significant differences in student achievement before and after learning using chemical bonding textbooks with a multi-representation approach (Helni et al., 2013)

CONCLUSIONS AND SUGGESTIONS

A. Conclusion

Based on the results of the discussion, it can be concluded that hydrocarbon edugame media can improve student learning outcomes. This can be seen based on the results of the normality calculation output and t-test using SPSS. The normality test has a significance value of 0.05, so it can be said that the data is normal. While the t-test obtained $t_{count} > t_{table}$ with a comparison of 24.594: 1.708.

B. Suggestion

This research still refers to Hydrocarbon material only, so it can be developed again on other materials and can be modified by integrating other media..

REFERENCES

- Dwiningsih, K., Sukarmin, Nf., Muchlis, Nf., & Rahma, P. T. (2018). Pengembangan Media Pembelajaran Kimia Menggunakan Media Laboratorium Virtual Berdasarkan Paradigma Pembelajaran Di Era Global. *Kwangsan: Jurnal Teknologi Pendidikan*, 6(2), 156–176. <https://doi.org/10.31800/jtp.kw.v6n2.p156--176>
- Helni, W., Wildan, W., & Muntari, M. (2013). Pengembangan Modul Ikatan Kimia Berbasis MMS (Makroskopik Mikroskopik Simbolik) Untuk Meningkatkan Efektivitas Pembelajaran Kimia Siswa SMK. *Hydrogen: Jurnal Kependidikan Kimia*, 1(2), 122–129. <https://e-journal.undikma.ac.id/index.php/hydrogen/article/view/637>
- Hidayah, R., Suprianto, S., & Rahmawati, A. (2017). Permainan “Kimia Kotak Katik” Sebagai Media Pembelajaran Pada Materi Sistem Periodik Unsur. *JTK (Jurnal Tadris Kimiya)*, 2(1), 91–96. <https://doi.org/10.15575/jta.v2i1.1362>
- Irma Mananda, -. (2017). *Penggunaan Media Pembelajaran Macromedia Flash untuk Meningkatkan Pemahaman Konsep Siswa Padapokok Bahasan Hukum Newton*.
- Lafarge, D. L., Morge, L. M., & Méheut, M. M. (2014). A new higher education curriculum in organic chemistry: What questions should be asked? *Journal of Chemical Education*, 91(2), 173–178. <https://doi.org/10.1021/ED300746E>
- Miranda, E. D., Copriady, J., & Susliawati. (2012). Penggunaan Permainan Monopoli Sebagai Media Chemo-Edutainment Untuk Meningkatkan Prestasi Belajar Siswa Pada Pokok Bahasan Koloid di kelas XI IPA MAN 2 Model Pekanbaru. *Jurnal Online Mahasiswa Fakultas Keguruan Dan Ilmu Pendidikan Universitas Riau (JOM FKIP UNRI)*, 2(1), 1–10.
- Nurwidayanti, D., & Mukminan, M. (2018). Pengaruh media pembelajaran terhadap hasil belajar ekonomi ditinjau dari gaya belajar siswa SMA Negeri. *Harmoni Sosial: Jurnal Pendidikan IPS*, 5(2), 105–114. <https://doi.org/10.21831/hsjpi.v5i2.17743>
- Priatmoko, S., -, S., & Diniy, H. H. (2012). Penggunaan Media Sirkuit Cerdik Berbasis Chemo-Edutainment Dalam Pembelajaran Larutan Asam Basa. *Jurnal Pendidikan IPA Indonesia*, 1(1). <https://journal.unnes.ac.id/nju/index.php/jpii/article/view/2011>
- Sadiman, A. S. (2006). *Media Pendidikan pengertian, pengembangan dan pemanfaatannya*. <http://r2kn.litbang.kemkes.go.id:8080/handle/123456789/61227>
- Setiyani, S., & Santi, D. P. D. (2019). Implementasi Media Pembelajaran Dengan Macromedia Flash Untuk Meningkatkan Kemampuan Pemahaman Matematis Mahasiswa. *Jurnal Derivat: Jurnal Matematika Dan Pendidikan Matematika*, 6(1), 1–11. <https://doi.org/10.31316/j.derivat.v6i1.331>
- Sudjana. (2005). *Metode Statistika*. Tarsito.
- Sugiyono. (2013). *Metode Penelitian Kuantitatif dan Kualitatif dan R&D*. Alfabeta.
- Syafriani, D., Noer, A. M., Kelas, D. I., Mipa, X. I., & Kampar, S. (2017). *the Application of Learning Media Hydrocarbon Based Aurora 3D Presentation To Improve the Students Learning Achievement in Xi Mipa Class Sman 1 Kampar Penerapan Media Pembelajaran Hidrokarbon Berbasis Aurora 3D Presentation Untuk Meningkatkan Prestasi Bel*. 1–13.
- Yolanda, N. S., & Iswendi, I. (2019). Pengembangan Permainan Ludo Kimia Sebagai Media Pembelajaran Pada Materi Bentuk Molekul Kelas X SMA/MA. *Edukimia*, 1(2), 9–14.

<https://doi.org/10.24036/ekj.v1.i2.a17>

Yulianti, T., Herkulana, H., & Achmadi, A. (2018). Pengaruh Penggunaan Media Pembelajaran Terhadap Hasil Belajar Siswa Pada Mata Pelajaran Ekonomi Di SMA. *Jurnal Pendidikan Dan Pembelajaran Khatulistiwa*, 7(1). <https://jurnal.untan.ac.id/index.php/jpdpb/article/view/23511>