Effectiveness of "SAFETYPOLY" Learning Media in Improving Public Knowledge of Chemical Hazards in the Printing Industry

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Abstract: In today's development, many games are played by all groups, from small children to adults and older people. This game can be used for fun or as a learning medium. This game can also be used to increase public knowledge, one of which is regarding occupational safety and health. There is a game that can be used to improve understanding in society, namely monopoly. Therefore, this research aims to determine the effectiveness of monopoly learning media, which contains occupational safety and health "safetypoly", in increasing public knowledge regarding Occupational Safety and Health. This study used a quantitative research approach with a pre-experimental type of research. The research design used in this study was the *One Group Pretest-Posttest Control Design*. Data collection methods include questionnaires, observation, and interviews. The data analysis methods used in this research are the Validity Test, Reliability Test, Normality Test, and Wilcoxon Test. The "Test Statistics" output is known as Asymp based on the research results.Sig. (2-tailed) is worth 0,000. The value of 0.000 is smaller than <0.05, so there is a difference between the pre-test and post-test results. Apart from that, there was an increase in workers from 20% to 80%. It can be concluded that the safetypoly game influences students' level of knowledge regarding the dangers of chemicals, so this game is effectively used as an educational medium related to occupational safety and health.

Keywords: learning media, chemical dangers, monopoly

INTRODUCTION

Learning media is anything that can convey messages through various channels; for example, it can stimulate participants' thoughts, emotions, and desires to ease the creation of an effective learning process that allows participants to add new information and fully achieve their learning goals (Daniyati et al., 2023). Learning media is a technology used as a messenger or channel for learning purposes (Winarto et al., 2020). Learning media, in the learning process, equates students' perceptions of the material presented (Puspitarini & Hanif, 2019). Learning media functions to explain the material being taught and support communication between the giver and recipient (Wulandari et al., 2023).

A game is an activity that determines one or more players in certain circumstances, in which there are winners and losers, intended to fill free time while having fun (Yulianti & Ekohariani, 2020). Educational games have been utilized as a creative teaching strategy to attain more effective learning. In simple terms, Whitton defines educational games as learning that is eased through the use of games, and the development of educational games is an innovative form of interactive multimedia that combines educational content (Syahidi et al., 2021). Games may be used as educational media that can reserve teaching tools. Educational games are used in the learning process and contain educational elements or values (Andari, 2020). Increasing knowledge through game-based learning media may improve participants' creativity, motivation, and entertainment during training (Arifudin et al., 2020). It is hoped that the use of learning media with a game system can create exciting teaching and learning activities. Hence, the learning experience is not boring for students, can train cooperation, increase understanding of the material being taught, speed up the information process, solve problems, and increase social sensitivity (Fitrianingtyas et al., 2023). There are several learning media with game methods that can be used, one of which is the monopoly game.

Monopoly game is one of the learning media that can help to increase knowledge of the implementation of the game (Syalfifi et al., 2019). Monopoly, according to Masnarati (2020), is a game that aims to enable participants to know the names of nations within the world or the names of cities in Indonesia, understand how to oversee money, namely the idea of earnings and losses, and educate the concept of honesty and understand the guidelines, and can actualize them in the game (Nurhayati et al., 2022). The advantages of the monopoly game include that it

provides a fun learning atmosphere and can make participants more active in learning. Monopoly can make students active during the learning process and build interaction between students (Fitrianingtyas et al., 2023). The monopoly game is an innovative learning medium modified and played by two or more people, emphasizing mastering the material to be presented (Sihotang, 2022). Monopoly games are a flexible medium easily modified to suit learning needs or specific contexts (Sabono et al., 2023).

Based on the description above, researchers are interested in finding out the effectiveness of the safetypoly game as a learning medium to increase workers' knowledge regarding safety and health in the workplace, especially regarding chemicals. The "safetypoly", or monopoly game that contains chemical safety and health, aims to increase participants' knowledge regarding safety and health education, especially regarding chemicals in the printing industry.

METHODS

This study used a quantitative research approach with a pre-experimental type of research. The research design used in this study was the *One Group Pre-test – Post-test Control Design*. Respondents in this study were students of Universitas Negeri Semarang, totaling 30 respondents. Data collection techniques in this study were questionnaires, observations, and interviews. The data analysis methods used in this study are the Validity Test, Reliability Test, Normality Test, and Wilcoxon Test.

RESULT AND DISCUSSION

Games are one of the learning media that can help increase the success of learning and require interaction between one player and another player who is guided by the rules that have been made (Anisa Sapitri & Iswendi, 2023). In this study, respondents tested knowledge regarding chemical hazards through a game called *safetypoly* against 30 general public members and three printing press workers. Before this game was tested on respondents, a validity test was carried out first to test whether or not the questions asked to respondents were valid (Sanaky et al., 2021).

Based on validity tests carried out on 40 respondents, 15 of the 20 questions tested were declared valid. The question is valid if the calculated r value exceeds the r table. The r table value with a sample size (N) of 40 uses a significance level of 5% (95% confidence level), namely 0.312. All r calculations on the 15 questions tested exceeded the r table value (0.312), so the questions were valid. After the validity test, 15 valid questions were tested using a reliability test. Based on the reliability test output table, the number of questions is 15, with a Cronbach's Alpha value for 8 questions of 0.777, and the other 7 items are 0.556. After the questions are valid, the respondents can do the pre-test and post-test. Respondents carried out the pre-test before playing the safetypoly game, while the post-test was carried out after playing the safetypoly game. After the pre-test and post-test data were collected, a normality test was then carried out. Based on the data normality test, the results of the pre-test and post-test by 30 respondents showed significance values *shapiro-wilk* of 0,000. The significance value is less than 0.05, so the data is not normally distributed.

Table 1. General Public Pre-test and Post-test Scores

Measure	Pre-test	Post-test
Mean	79.77	97.90
Median	86.00	100.00
Std. Deviation	18.573	3.745
Variance	344.944	14.024
Range	80	14
Minimum	20	86
Maximum	100	100

Table 1 shows that the average pretest score for the general public is 79.77, and after learning about the safetypoly game, the average score for the general public is 97.90. Based on this data, it appears that there has been an increase in the number of pre-test and post-test results among the general public.

Table 2. Workers' Pre-test – Post-test Scores

Employee	Pre-test	Post-test
Employee 1	60	100
Employee 2	86	100
Employee 3	46	80

The safetypoly game was also tested on 3 printing workers. The three of them experienced an increase in knowledge after playing the safetypoly game. Worker 1's pre-test score was 60, and the worker scored 100 during the post-test. Worker 2 got a pre-test score of 86; during the post-test, he got a 100. Worker 3 got a score of 46, and after doing the post-test, worker 3 experienced an increase in the score obtained by 80 points. Based on this data, there appears to be an increase between workers' pre-test and post-test results.

Table 3. Wilcoxon Test for General Community Pre-test and Post-test

Measure	Value
Negative	0
Positive	24
Ties	6
Total	30
Mean Rank	12.50
Sum of Ranks	300.00
Z	-4.308
Asymp.Sig. (2-tailed)	0.000

Next, the Wilcoxon test was carried out to determine the significance of the difference in pre-test and post-test scores because the data was not normally distributed after testing for normality. The negative rank value or the difference (negative) between the pretest and post-test results in the general public is 0 (zero), both in the N value, Mean Rank, and Sum Rank. This value shows no decrease from the pre-test value to the post-test value. The positive rank value or the difference (positive) between the pre-test and post-test results shows 24 positive data (N). This means that 24 (80%) respondents experienced an increase from the pre-test value to the post-test value; the mean rank or average increase was equal to 12.50, while the number of positive ranks or sum of ranks was 300.00. Meanwhile, 6 (20%) other respondents obtained pre-test and post-test results that did not increase or decrease.

Based on the results of the Wilcoxon test, it is known that Asymp.Sig. (2-tailed) has a value of 0.000 (α = 0.05). The value of 0.000 is smaller than 0.05, so there is a difference between the pre-test and post-test results. It can be concluded that the safetypoly game influences the general public's level of knowledge regarding the dangers of chemicals, so this game is effectively used as an educational medium for occupational safety and health. Based on these results, it can be seen that media is an essential component in learning. This is in line with research conducted by (Rindayani et al., 2022) with the title "Effectiveness of Monopoly Game to Increase Knowledge of South Sulawesi Culture among Students at Runiah School," which states that monopoly media is an effective learning media in increasing students' knowledge of South Sulawesi culture. Research conducted by (Wahdini et al., 2022) also shows that the monopoly game is effective for learning vocabulary. It has been proven that student learning outcomes in the posttest are higher than in conventional learning.

CONCLUSION

Based on the research, it can be concluded that the safetypoly learning media influences students' increasing knowledge of occupational safety and health, as evidenced by the results of the pretest and post-test p-values. <0.05 (significant). The safetypoly learning media tested on workers showed increased knowledge of occupational safety and health. This can be proven by increasing the percentage of worker knowledge from 20% to 80%. Therefore, it can be concluded that the safetypoly learning media has proven effective in increasing knowledge of occupational safety and health among the public, especially workers at the printing press.

REFERENCES

Andari, R. (2020). Pemanfaatan Media Pembelajaran Berbasis Game Edukasi Kahoot! Pada Pembelajaran Fisika.

ORBITA: Jurnal Kajian, Inovasi Dan Aplikasi Pendidikan Fisika, 6(1), 135. https://doi.org/10.31764/orbita.v6i1.2069

Anisa Sapitri, & Iswendi, I. (2023). Efektivitas Penggunaan Media Permainan Ular Tangga Kimia Berbasis Android Materi Sistem Koloid terhadap Hasil Belajar Siswa Kelas XI SMA/MA. *Jurnal Pendidikan Mipa*, 13(2), 493–497. https://doi.org/10.37630/jpm.v13i2.1078

Arifudin, D., Sulistiyaningsih, E., Adila Kautsar, I., Studi, P. S., & Informasi, T. (2020). Optimization of The Digital Game-Based Learning Instructional Design (DGBL-ID) Method as Learning Support Media. *Jurnal Mantik*, 4(3), 2147–2154. https://iocscience.org/ejournal/index.php/mantik

Daniyati, A., Saputri, I. B., Wijaya, R., Septiyani, S. A., & Setiawan, U. (2023). Konsep Dasar Media Pembelajaran. *Journal of Student Research*, 1(1), 282–294. https://doi.org/10.55606/jsr.v1i1.993

Fitrianingtyas, I., Suryandari, K. C., & Tatminingsih, S. (2023). Pengaruh Media Pembelajaran Monopoli terhadap Minat dan Hasil Belajar Siswa Kelas IV SD Negeri di Gugus Nusa Kecamatan Karanganyar. *DWIJA CENDEKIA: Jurnal Riset Pedagogik*, 7(1), 409. https://doi.org/10.20961/jdc.v7i1.73548

Nurhayati, N., Rosdianti, V., Sari, A., Nurhaliza, N., & Fransisca, S. (2022). Developing Elementary School's Social Studies Learning Using the Monopoly Game. *Indonesian Journal of Multidisciplinary Science*, 1(6), 648–653. https://doi.org/10.55324/ijoms.v1i6.124

Puspitarini, Y. D., & Hanif, M. (2019). Using Learning Media to Increase Learning Motivation in Elementary School. *Anatolian Journal of Education*, 4(2), 53–60. https://doi.org/10.29333/aje.2019.426a

Rindayani, S., Aulia Pandung Radha, T., Muhammad Nur, Y., Rahayu, S., Wahyuni Salman, S., & Meizara Puspita Dewi, E. (2022). Efektivitas permainan monopoli untuk meningkatkan pengetahuan tentang budaya Sulawesi Selatan pada siswa di Runiah School. *Altruis: Journal of Community Services*, 3(4), 1–4. https://doi.org/10.22219/altruis.v3i4.23452

Sabono, R. E., Nirahua, J., & Sapulete, H. (2023). Pengembangan Media Pembelajaran Permainan Monopoli Untuk Meningkatkan Penguasaan Materi Alat-Alat Optik. *PHYSIKOS Journal of Physics and Physics Education*, 2(1), 9–19. https://doi.org/10.30598/physikos.2.1.9308

Sanaky, M. M., Saleh, L. M., & Titaley, H. D. (2021). Analisis Faktor-Faktor Keterlambatan Pada Proyek Pembangunan Gedung Asrama Man 1 Tulehu Maluku Tengah. *Jurnal Simetrik*, 11(1), 432–439. https://doi.org/10.31959/js.v11i1.615

Sihotang, N. (2022). Penerapan Permainan Monopoli Dalam Meningkatkan Minat Belajar Siswa SD. *Prosiding SENKIM: Seminar Nasional Karya Ilmiah Multidisiplin*, 2(1), 60–67.

Syahidi, A. A., Supianto, A. A., Hirashima, T., & Tolle, H. (2021). Learning Models in Educational Game Interactions: A Review. *International Journal of Engineering Education*, 3(1), 1–7. https://doi.org/10.14710/ijee.3.1.11-29

Syalfifi, E., Syarif Sumantri, M., & Yatima, D. (2019). Implementation of Word Monopoly as a Learning Media to Improve Creative and Moral Attitudes in the Students of Class IV Students in Grade IV of SDN Srengseng Sawah 15 Pagi. *American Journal of Educational Research*, 7(1), 97–103. https://doi.org/10.12691/education-7-1-15

Wahdini, A. G., Hadi, S., Hafidah, A. S., Wahdini, A. G., Hadi, S., & Hafidah, A. S. (2022). Academic Year of 2021/2022. *ELITE Journal*, 4(1), 49–62. https://www.elitejournal.org/index.php/ELITE

Winarto, W., Syahid, A., & Saguni, F. (2020). Effectiveness the Use of Audio Visual Media in Teaching Islamic Religious Education. *International Journal of Contemporary Islamic Education*, 2(1), 81–107. https://doi.org/10.24239/ijcied.vol2.iss1.14

Wulandari, A. P., Salsabila, A. A., Cahyani, K., Nurazizah, T. S., & Ulfiah, Z. (2023). Pentingnya Media Pembelajaran dalam Proses Belajar Mengajar. *Journal on Education*, 5(2), 3928–3936. https://doi.org/10.31004/joe.v5i2.1074

Yulianti, A., & Ekohariani. (2020). Pemanfaatan Media Pembelajaran Berbasis Game Edukasi Menggunakan Aplikasi Construct 2 Pada Mata Pelajaran Komputer Dan Jaringan Dasar. *IT-Edu : Jurnal Information Technology and Education*, 5(1), 527–533. https://ejournal.unesa.ac.id/index.php/it-edu/article/view/38272