

The Effect of Edutainment-Based Chemistry Learning Media on Science Process Skills: A Literature Review

Theresia Putri Maniar Sitanggang^{1*}, Rosalina Eka Permatasari²

^{1,2*} Universitas Negeri Surabaya, Surabaya, Indonesia



ABSTRACT

Keywords:

Learning Media
Edutainment
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Developing Science Process Skills (SPS) is vital for students, but in chemistry, this process is frequently constrained by abstract concepts and low levels of student engagement. As a solution, this study analyzes and synthesizes various scientific literature. As an alternative, this research conducts an analysis and synthesis of relevant studies to investigate how edutainment-oriented learning media impact SPS. Using a systematic literature review method, various relevant studies from scientific publication database were identified, evaluated, and interpreted. The analysis results show that the majority of studies concluded that edutainment media has a significant positive effect on improving SPS. The effectiveness of this media is proven due to its ability to increase interest and help visualize concepts, thus facilitating the development of more optimal SPS. It can be concluded that edutainment is a very potential approach to address the challenge of chemistry learning at the high school level.

INTRODUCTION

Education in essence involves a purposeful learning process for develop skills, activities, and creativity participant educate through various interactions and experiences learn, so that learning become more meaningful. Learning process in class demand participant educate for always active as well as develop ability self that is owned, among ability self that must be owned by participants educate in facing the era of globalization moment This is capable attitude adapt and fortify self (Al Rasyid, M., & Partana, CP, 2021). One of the ways that can carried out by educators for involving participant educate in a way active in the learning process is using media or teaching materials that can help participant educate in understand draft.

The terms "century of globalization" and "period of the fourth industrial revolution" are nicknames often attached to the 21st century. According to Rahayu et al. (2022), the rapid development of science and technology (IPTEK) throughout the 21st century has brought a number of developments that have led to shifts in learning models, marked by changes in media, curriculum, and technology. As is well known, the 21st century has experienced a number of developments, including in the fields of technology an education. Lase (2019) argues that to adapt to the progress of the Industrial Revolution 4.0, the essential thing to do is to improve the quality of human resources through formal education, which includes elementary, secondary, and university levels.

The set of skills that a scientist utilizes in conducting scientific investigations is called science process skills. These skills encompass various abilities needed to discover concepts, principles, or theories. The rapid development of science and technology makes science process skills a crucial competency in the context of modern learning (Jayanti, E.D., 2024). The cause of the lack of in-depth understanding of several aspects of science

process skills in students is that teaching and learning activities are not yet effective in implementing the development of these skills. Despite efforts to engage students in the learning process, students themselves still engage in activities not included in the learning process, such as chatting with friends and some students working on assignments from other subjects during the learning process. The existence of this problem requires a quick and appropriate solution so that the learning process can run more optimally (Susi & Elvi, 2020). Educators in the modern era are required to integrate the latest technology as a medium that can assist the learning process while improving its quality (Fitra & Maksum, 2021). To ensure the learning process runs smoothly and the material is delivered in an engaging manner, the use of media is highly recommended. Media itself is essentially an intermediary that carries messages or information from a source to its recipient or target (Apriansyah, 2020).

The term Edutainment is a combination of two words, namely education which means education and entertainment which means entertainment (Hamid, 2011:17). Therefore, linguistically, edutainment is education that is entertaining or enjoyable. In terms of terminology, edutainment can be understood as a pedagogical design that merges education and entertainment in order to create a pleasant and effective learning atmosphere (Hamid, 2011:17). The edutainment method combines elements of education and entertainment in the learning process. By using technology and interesting media, such as computer games, videos, or print media, this method aims to make learning more enjoyable and effective. In this context, the edutainment method can be applied in various fields, such as mathematics, science, language, and so on (Sutopo, 2018:9).

The process of developing Science Process Skills (SPS) in students faces obstacles when their interest in learning is low and when they have difficulty visualizing non-concrete chemical concepts. Students' ability to think, work, and communicate in a way that represents a scientist can be formed through mastery of Science Process Skills. The development of these skills is hampered when learning interest is low and visualization of complex concepts is inadequate. Therefore, an innovative approach to chemistry learning is needed to address these issues. One solution is the use of edutainment-based learning media. This media integrates educational and entertainment elements, which is expected to increase learning interest and help visualize abstract concepts. This study examines how the implementation of edutainment-based chemistry learning media influences the Science Process Skills (SPS) possessed by high school students.

RESEARCH METHOD

The study applies a systematic literature review design aimed at thoroughly examining, appraising, and consolidating the results of relevant published works.

National articles published online were included as the research population. The article sorting process also applies the criteria that the research subjects used must be high school level students. Research Data Based on the data criteria required in this review, 5 (five) suitable articles were selected, published in the last 5 years.

Data collected from 5 (five) articles was then analyzed by briefly describing the research findings. Drawing conclusions is done by examining the consistency and interrelationships between the findings of the studies reviewed.

RESULTS AND DISCUSSION

The following is Table 1 which explains the publication of indexed journals and Table 2 explains the results of the analysis carried out through a literature review, namely:

Table 1. Indexed Journal Publication in Indonesian

Year	Journal Name	Number Of Articles	Type Of Publication
2025	Development and Evaluation of Articulate Storyline-Based Interactive Media: Integration of Socio-Scientific Issues in Hydrocarbon Learning to Enhance Students' Critical Thinking Skills	1	Sinta 2
2024	The Development of ChemicoMine, Maritime Chemistry Comic Webtoon as an Edutainment Media Accordance to the IMO Regulations	1	Sinta 2
2024	Development of an Augmented Reality-Based Chemical Bonding Module Assisted by the Assemblr EDU	1	Sinta 2
2023	Learning Media Development ChemoEdutainment-based Web Learning with Games Treasure in The Material Basic Laws of Chemistry	1	Sinta 4
2023	The Influence of Android-Based Learning Media on Students' Learning Outcomes and Science Process Skills	1	Sinta 4
2023	The Effect of Using Chemo-Edutainment-Based Ludo Game Media on Colloidal System Material on Chemistry Learning Outcomes of Grade XI SMA/MA Students	1	Sinta 4
2024	The Effect of Project-Based Learning Model Assisted by Lectoran Inspire Based Media on Student's Science Process Skills	1	Sinta 4
2024	The Effect of Project-Based Learning Assisted by Comic Media on Chemical Science Process Skills in Reaction Rate Material for Class XI MIPA Students of SMAN 1 Lembar	1	Sinta 4
2024	The Effect of ChemoEdutainment-Based Ludo Chemistry Game on Atomic Structure Material on The Learning Outcomes of Grade X.E Stundents	1	Sinta 4
2025	Development of Interactive Multimedia Based on Problem Based Learning and Chemo Edutainment Using the Nearpod Application on Acid-Base Material	1	Sinta 5

Table 2. Research Articles Analysis Result

No.	Writer	Method	Research Findings
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1.	(Nora'in, Miranda, et al., 2025)	Research and Development (R&D)	The evaluation of this learning media showed positive outcomes. It was deemed highly valid with scores of 0.89 (subject matter experts) and 0.88 (media experts). The media's practicality was also rated as very high, achieving an average score of 4.59 in both Science A and B classes based on readability questionnaires, user responses (students and teachers), and classroom observations. Furthermore, the media proved effective in significantly enhancing critical thinking skills, evidenced by high n-gain scores of 0.77 (Science A) and 0.78 (Science B).
2.	(Nafillah, K., Sari, D. W., & Purwanto, P., 2024)	Research and Development (R&D)	The ChemicoMine comic media demonstrated a very high level of feasibility in all aspects of the assessment. Validation by material experts gave a score of 87.66%, while validation by media experts reached 95.28%. In fact, the storyboard as the initial development framework was also validated with a score of 86%. In addition to experts, the response from students was also very positive, with a score of 88.94%. With all assessments in the "very good" category, it can be concluded that the ChemicoMine comic has great potential to be implemented as an alternative edutainment learning medium. This comic can be widely accessed by users through the Line Webtoon application and website.
3.	(Pamenang, F. D. N., & Utami, A. N., 2024)	Research and Development (R&D)	This augmented reality module proved to be highly valid, practical, and effective. Its high level of validity was confirmed by a product validity score of 89.33% and a media validity score of 93.5%. Based on user responses, the module was also deemed highly practical, with a score of 88.14%, indicating a very positive response from students. Furthermore, its effectiveness was confirmed by an average evaluation score of 70 from all participating students.
4.	(Faniyah, I. 2023)	Research and Development (R&D)	The development of a chemoedutainment web media with a treasure hunt game feature has proven valid and effective for basic chemistry law material. Its high validity level (0.81) was supported by a positive response from 86.2% of students, thus confirming its suitability for the teaching and learning process. This media also successfully improved student learning outcomes in the moderate category, as indicated by an increase value of 0.45.
5.	(Lala Dwi Sasmitha, et al., 2023)	Quasi-experimental design	Data analysis demonstrated a significant effect of Android-based learning media on learning outcomes ($p = 0.001$) and science process skills ($p = 0.019$). However, the impact on science process skills was not uniform across all indicators. Specifically, the aspects of observing, formulating hypotheses, and designing and conducting experiments showed significant improvement. However, no significant effect was found on the

			aspects of problem formulation, concept application, and conclusion drawing.
6.	(Putri, A., & Iswendy, I. 2023)	Quasi-experimental	A study of eleventh-grade students at SMAN 1 Ulakan Tapakis showed that learning outcomes for colloidal systems were significantly superior in the experimental class using a chemo-edutainment (CET)-based chemical Ludo game. This achievement was significantly different compared to the control class whose learning did not involve the game, indicating a positive effect of the use of CET.
7.	(Surayya, et al. 2024)	Quasi-experimental design	The statistical analysis, conducted at a significance level of 0.05 and 59 degrees of freedom, produced a t-value of 5.1375, which was greater than the t-table value of 2.001. Accordingly, the null hypothesis (H_0) was rejected, confirming a significant disparity in chemical science process skills between the experimental group using PjBL with Lectora Inspire media and the control group employing conventional instruction at SMAN 1 Lembar.
8.	(Irawan, R. S., 2024)	Quasi-experimental research	The science process skills (SPS) of class XI MIPA students at SMAN 1 Lembar on the topic of reaction rates improved significantly following the implementation of project-based learning (PjBL) supported by comic media. This improvement was reflected in the N-gain results, where the experimental group obtained a moderate increase ($0.30 < g < 0.70$), while the control group only reached the low category ($0.00 < g < 0.30$). The statistical significance of these findings was confirmed by a t-count of 3.15, exceeding the t-table value of 1.671 at $\alpha = 5\%$.
9.	(Farisi, A. I., & Iswendy, I. 2024)	Quasi-experimental research	The improvement in cognitive learning outcomes in Grade X Phase E students of SMAN 14 Padang was confirmed after the use of the Ludokimia game. This is based on the superiority of the experimental class which recorded an average score of 85, surpassing the control class with a score of 79.56. The significance of this difference is also supported by statistical data from the t-test (t-count 3.07 > t-table 1.67) and a significantly higher percentage of learning completion (91.67% vs 77.78%).
10.	(Nova, N., et al, 2025)	Research and Development (R&D)	Interactive multimedia developed for acid-base material with the Problem-Based Learning and chemo-edutainment models is confirmed to be "very suitable" for use in the chemistry learning process. This suitability is based on the results of validation by material experts reaching 90.6% and validation by media experts at 84%. In addition, this media received a "very good" response from students, as evidenced by the results of individual trials (92%) and small groups (93.6%). Thus, it is concluded that this multimedia has the potential to increase student learning motivation.

Based on Table 2, an analysis of ten relevant research articles shows a consistent and strong pattern regarding the use of Edutainment-based chemistry learning media providing a significant positive influence on Science Process Skills (SPS) and learning outcomes of high school students. Most of the studies analyzed used Research and Development (R&D) and Quasi-Experimental methods. R&D studies consistently show that the developed media (such as comics, webtoons, Augmented Reality modules, and interactive multimedia) have a level of validity and practicality that is "very good" or "very feasible" according to experts and students. Meanwhile, quasi-experimental studies prove the effectiveness of these media in the classroom. These studies show a significant increase in SPS, critical thinking skills, and cognitive learning outcomes in the experimental group using Edutainment media compared to the control group.

CONCLUSION

Based on a systematic literature review of 10 relevant research articles, it can be concluded that the application of edutainment-based chemistry learning media significantly and effectively improves students' Science Process Skills (SPS) at the senior high school (SMA) level. Media that integrates educational and entertainment elements, such as games, comics, and interactive multimedia, has proven valid, practical, and capable of creating a more engaging and enjoyable learning environment. The effectiveness of this approach lies in its ability to increase students' interest and motivation to learn, while also helping them visualize abstract chemical concepts.

Thus, students become more actively involved in the learning process, which in turn supports the development of various SPS indicators, from observation and hypothesis formulation to experimental design. Therefore, edutainment is a strategic and highly potential approach that educators can rely on to address challenges in chemistry learning and optimize student competency achievement in the 21st century.

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