



Preventing Brain Rot: Learning Using Youtube Video Media in Testing Students' Analytical Abilities

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Abstract: The phenomenon of brain rot, or the decline in analytical thinking skills due to passive consumption of digital content, is a new challenge in modern education. This study aims to test whether YouTube video-based learning improves students' analytical skills compared to conventional learning. The term "brain rot" has garnered widespread attention and has been discussed in both popular and academic literature recently; several articles and reviews have suggested a link between consuming short/shallow content and decreased concentration, cognitive overload, or reduced deep thinking. Social media has positive impacts, such as a means for socializing, self-expression, seeking entertainment, obtaining information, building networks, and supporting the educational process, its negative side is also real. The research method used a quantitative approach with a quasi-experimental design. The study, conducted before and after the use of image learning media, significantly improved students' analytical skills. The results of the analysis of the analytical thinking skills test revealed changes in learning, indicating an increase. This means that the average sample remained in a normal brain state and did not experience a decline or brain decay in their analytical skills. The conclusion of this study is that targeted learning using YouTube videos can prevent brain rot by improving students' analytical skills.

Keywords: Analytical Skills; Brain Rot; Learning Media; Youtube

Introduction

The digitalization of education encourages teachers and researchers to utilize video-sharing platforms, particularly YouTube, as learning resources and media. Information technology has significantly impacted education in Indonesia, particularly in terms of obtaining information and up-to-date references for educators, both in terms of learning materials and media (Area-Moreira et al., 2023; Criollo-C et al., 2021). The nature of video (visual & audio) facilitates the presentation of abstract concepts, demonstrations of procedures, and the presentation of case studies that are tested in relevant aspects to train students' analytical thinking. Research by (Chen et al., 2025), shows an increase in motivation and learning outcomes when

YouTube is used appropriately in learning. Various studies and research results indicate that the use of YouTube videos can increase student motivation, engagement, and conceptual understanding in various subjects (mathematics, biology, history). This effective implementation can generally occur when it involves selecting quality videos, active task guidance, and integration with class discussions or structured assignments (Almulla, 2020; Awi et al., 2025). Therefore, the use of social media and the rapid development of information in the form of social media is unstoppable. It is necessary to use this social media wisely. The rapid development of the digital world has made social media a crucial part of everyday life (Mumtaha & Khoiri, 2019). The development of online video platforms like YouTube has opened up vast opportunities for engaging

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and easily accessible multimedia learning. YouTube has facilitated service providers in creating and distributing informative, educational, and engaging content to the wider public (Suharsono & Nurahman, 2024). Educational video is a technology for capturing, recording, processing, transmitting, and rearranging live (moving) images so that they can be viewed and heard simultaneously (D'Antuono, 2022).

Strengthening literacy through animated video media for children can provide positive benefits, as children are currently faced with the unavoidable development of advanced technology. They must also maintain a strong level of literacy and be wise in using technology to avoid negative impacts on children that can reduce interest and motivation to learn (Putra & Nasution, 2024). Through digital literacy, encouraging interaction, and cognitive training, people can strive to regenerate mental abilities dulled by the relentless digital era (Mishra & Mishra, 2024). Therefore, knowledge of how to utilize social media technology is necessary to prevent significant impacts. At the same time, concerns have arisen about the recently popular phenomenon of "brain rot," a term describing the negative cognitive effects of repetitive and shallow online content consumption (Hasmiza & Humaidi, 2023). The term "brain rot" has garnered widespread attention and has been discussed in both popular and academic literature recently; several articles and reviews have suggested a link between consuming short/shallow content and decreased concentration, cognitive overload, or reduced deep thinking.

Although initial empirical research has emerged, quantitative studies testing educational interventions for mitigation are still needed (Yousef et al., 2025). Brain rot behavior manifests in various forms, such as video game addiction, where players become so immersed in virtual worlds that they neglect other aspects of life. Currently, the effects of brain rot video content addiction are also being experienced by late-teen college students, whose popularity is considered a characteristic feature that must be emphasized to appear cool in the community (Faiq Al Azis et al., 2025). Research Nengah Parta (2016) found that brain rot caused by excessive social media consumption is a major problem that needs to be addressed. This issue needs to be evaluated. It can be clearly stated that social media is a global public good based on its characteristics. In fact, because of the low-value and low-quality content widely consumed on social media, brain rot is an example of a tragedy of the commons. Although social media has positive impacts, such as a means for socializing, self-expression, seeking entertainment, obtaining information, building networks, and supporting the educational process, its negative side is also real. Social media facilitates access

to inappropriate content such as violence and pornography, and can lead to addiction (Muhammad Arsyad & Noor Hasanah, 2025). Several studies have shown that YouTube-based learning designs that require cognitive activities such as creating critical summaries, video analysis, and creating response videos can improve students' critical thinking and analytical skills. This forms the basis for the hypothesis that YouTube, when used pedagogically, can help prevent brain rot.

According to Piaget, in developing cognitive thinking skills (analyzing, critical and creative thinking), he stated that children build their understanding of the world through a series of developmental stages involving the processes of assimilation and accommodation. According to Hanfstingl et al. (2022), Assimilation is the process of incorporating new information into existing cognitive schemes or structures, while accommodation is the process of modifying existing schemes or creating new schemes to adapt to new information. Based on the research results of Cahyati & Subali (2022), several things that can cause students to be less able to analyze concepts, namely a. because students do not understand the material being taught, because students only memorize without understanding the material. b. students' low analytical thinking skills are caused by students' lack of ability to analyze statements which is shown by not being able to provide correct and complete reasons so that their ability to conclude is still low and not yet accustomed.

According to Bloom's revised taxonomy by Monib et al. (2025), analysis is the ability to break down information into small parts, understand the relationships between these parts, and evaluate their relevance to a particular context. Furthermore, according to Hattan et al. (2024) in the process of analyzing students must have certain knowledge, understanding, and application. Analytical thinking is flexible thinking because it depends on the characteristics of the task or problem to be solved. The steps of analytical thinking are quite varied in essence starting from a problem that will be solved with logical and reasonable stages, systematic, and based on evidence and verification so that the conclusions from solving the problem can be justified. Therefore, video-based learning designed with an analytical approach can be an effective means to train students to develop their abilities. higher-level thinking, while preventing the emergence of passive learning behaviors synonymous with brain rot.

In carrying out activities to improve analytical thinking skills, it is necessary to have learning that stimulates the development of analytical thinking. Furthermore, the problem in learning biology is that one

of the subjects is considered difficult to understand, because learning biology is abstract, there are many scientific languages and Latin and complex learning concepts and learning materials that are difficult to explain because biology is not just memorizing facts, concepts and theories. One of the learning materials used in learning activities is the biodiversity of living things. In addition, the material in biodiversity is in the form of various serious threats, such as habitat destruction (deforestation, reclamation, pollution), excessive exploitation (fishing or poaching), global climate change, the entry of invasive species that disrupt local ecosystems, urbanization and monoculture agriculture.

Therefore, in-depth analytical thinking is needed in solving problems, therefore there is a need for learning that encourages analytical thinking training. To improve students' analytical thinking skills about environmental problems, knowledge about the concept of sustainable development is needed as a provision to obtain more ideas, ideas and be able to evaluate the consequences of decision making. However, the knowledge possessed will not contribute well and will only be potential, if it is not supported by the implementation of appropriate learning strategies and approaches. From this information, the researcher made the research objective to test whether YouTube video-based learning is able to improve students' analytical skills compared to conventional learning (image media) on biodiversity material.

Method

This study uses a quantitative approach with a quasi-experimental method (quasi-experiment). The subjects of the study were 20 students of class 10 of Madrasah Aliya Bina Mulia Depok. The study conducted a test before treatment, namely the use of YouTube media to measure the ability to analyze an object in YouTube media. The media used were images on the material of biodiversity of living things by describing questions from the image before being given treatment. After the activities before and after the treatment were carried out, the extent of the students' analytical abilities was compared, seen from the group of students with the length of time they used social media per day. The instruments used included: Case-based analytical ability test, Learning engagement observation sheet, Perception questionnaire on learning using videos. Data were analyzed using a t-test to compare the increase in analytical abilities between groups of students with the length of time they used through learning using image media (before) and after using YouTube media.

Result and Discussion

Descriptive Analysis

Results of Descriptive Analysis Using Images

The following are the results of the descriptive analysis using images:

Table 1. Results of Descriptive Analysis Using Images

N/Valid	20
Missing	0
Mean	3.95
Median	70.00
Mode	70
Std. Deviation	9.81
Variance	96.26
Range	43
Minimum	55
Maximum	98
Sum	1479

From the analysis results table, it shows that the maximum score is 98 and the minimum score is 55. This shows that there is a possibility of developing analytical thinking skills in students with an average of 73.95. It is possible that after being given treatment, there will be more students who exceed the average, where from the number of students with an average score of 3 students and those who exceed the average are 8 students. This can be seen from the Figure 1.

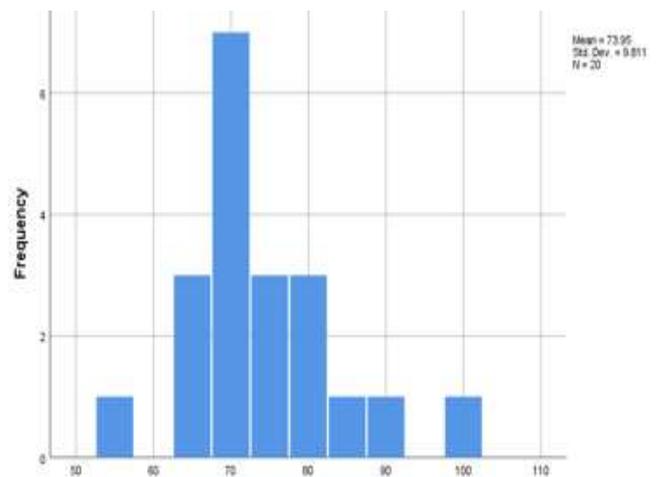


Figure 1. Learning Graph Using Image

Media The graph shows that there is a possibility of changes in analytical thinking skills, with scores of 70 being obtained more often than the average of 73.95. Although slightly lower than the average score, it is possible that analytical thinking development can occur if provided with treatment guidance.

Results of Descriptive Analysis Using YouTube Videos

The following are the results of the descriptive analysis using YouTube media:

Table 2. Results of Descriptive Analysis Using YouTube Video Media

N/Valid	20
Mean	77.55
Median	77.50
Mode	75
Std. Deviation	9.24
Variance	85.41
Range	37
Minimum	55
Maximum	92
Sum	1551

From the analysis results table, it shows that the maximum score is 92 and the minimum score is 55. This shows that there is a development in analytical thinking skills in students with an average of 77.55 after being given more treatment, the number exceeds the average, where from the number of students with an average score of 3 students and those who exceed the average are 10 students. This can be seen from the following Figure:

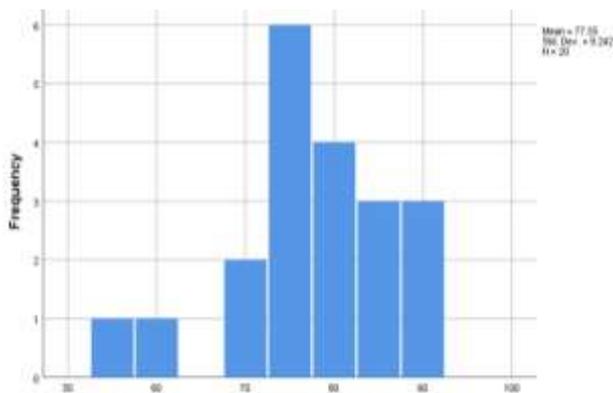


Figure 2. Learning Graph Using YouTube Videos

The graph shows a change in analytical thinking skills, with scores between 70 and 75 being more common than the average of 77.55. This higher score indicates an increase in analytical thinking development after receiving guidance and treatment using YouTube videos in the learning process.

Normality and Homogeneity Test Analysis

Normality Test

The following are the results of the normality test analysis:

Table 3. Results of the Normality Test Analysis Using YouTube Videos

Outcome	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Using YouTube Videos	0.191	20	0.053	0.938	20	0.219

a. Lilliefors Significance Correction

Based on the normality test results table, the data are normally distributed. The Shapiro-Wilk table results, with a significance level of $0.219 > 0.05$, indicate a normal distribution.

Homogeneity Test

The following are the results of the homogeneity test analysis:

Table 4. Results of the Homogeneity Test Analysis Using Image Media (Before) and YouTube Video Media (After)

Learning Outcomes	Levene's		t	df	Sig. (2-tailed)	Difference	Std. Error Difference	t-test for Equality of Means	
	F	Sig.						5% Confidence Interval of the Difference	Lower
YouTube Video Media	0.213	0.647	-1.19	38	0.240	-3.60	3.01	-9.70	0.501
Image Media			-1.19	37.86	0.240	-3.60	3.01	-9.70	2.50

Based on the normality test results table, the data are homogeneously distributed. The Levene's Test for Equality of Variances results, with a significance level of $0.647 > 0.05$, indicate a homogeneous distribution.

Table 5. Results of the t-Test Analysis

		Paired Differences					t	f	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Using Images - Using Youtube Videos	3.60	5.61	.491	-10.90	3.70	-1.03	19	.315

t-Test Analysis

Based on the Table 5 t-test results, it can be seen that at a significance level of $0.31 > 0.05$, it shows that there is no difference in analytical thinking ability between using image media (before) and using video media in learning (after).

Discussion

The results of the analytical thinking ability test showed a change in learning, with an increase in the number of students, from the average description of 73.95 students before treatment, with an average of 8 students above the average. After treatment using YouTube, the average was 77.55 students, with a number of students above the average, indicating a change in analytical ability. This means that the sample is still in a normal brain state and has not experienced a decline or decay in the brain root of analytical ability (Cansino et al., 2018; Gerardo et al., 2020; Sun et al., 2025). From the results of the t-test analysis, students, given treatment using image media (before) and using YouTube video media (after) did not have a different impact on learning outcomes in testing analytical thinking skills (Musfiza et al., 2025; Nikparast et al., 2022; Otto, 2025).

This shows that students are in normal conditions, in using social media or other online media (Abu-Taieh et al., 2022; Navarrete et al., 2025). It is proven that from the analysis test of students' abilities in analyzing teaching media using images or using YouTube video media, students are still able to analyze the requested question instructions and students are able to describe the results of their analysis. It can be said that by providing problem-based learning and being asked to analyze, this method helps students reduce brain rot (Festiawan et al., 2021; Gunawan et al., 2025; Manuaba et al., 2022). The results of this study are the answer to everyone's concerns where the results of research findings from (Adam & Cik Soh, 2025), show that concerns surrounding the phenomenon with evidence suggesting that excessive digital consumption may indeed have a significant impact on attention, memory, critical thinking, and other cognitive functions through several neurobiological mechanisms.

This concern is fundamental to several studies on brainrot, where excessive consumption and use of social

media will reduce cognitive thinking abilities (analytical, critical, and creative) because the brain is lazy to analyze information because the information provided from social media is too fast and has answered many problems (Assenmacher et al., 2022; Denisova, 2023; Zubiaga et al., 2016)). Resulting in the brain being lazy to analyze the information obtained due to social media being consumed in its entirety without any information analysis. From the results of research by Horn et al. (2015); Mostafa et al. (2025); Zachlod et al. (2022), the brainrot phenomenon reflects cognitive changes and student learning culture due to excessive exposure to short videos on platforms such as TikTok, Instagram Reels, and YouTube Shorts, resulting in a decrease in the brain's capacity to maintain focus on tasks that require deep attention being disrupted and strengthening the instant dopamine cycle that interferes with the in-depth learning process. It can be said that the use of YouTube video media has an impact on students' analytical thinking abilities by being trained in analyzing appropriate videos in consumption with prohibited YouTube videos, thus avoiding brain rot or brainrot (Jemiard, 2024; Yang et al., 2021; Zhang & Li, 2025).

Conclusion

This research demonstrates that targeted learning using YouTube videos can prevent brain rot by improving students' analytical skills. Teachers play a crucial role in shifting YouTube usage from passive consumption to active learning that hones critical thinking. It can be argued that effective social media use will impact cognitive thinking skills, particularly analytical thinking. The researchers recommend that video-based learning be accompanied by analytical and reflective activities to prevent brain rot. Future research could explore the optimal duration and types of video content that most effectively stimulate analytical thinking across different age groups to maximize the cognitive benefits of digital learning.

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Author Contributions

Conceptualization; D. N. A.; methodology; G. M.; validation; Z. F. A.; formal analysis; A. M.; investigation; N. T.; resources; L. S.; data curation; A. S.; writing—original draft preparation; D. N. A.; writing—review and editing. G. M.; visualization: Z. F. A. All authors have read and agreed to the published version of the manuscript.

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Conflicts of Interest

The researchers funded this research independently

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