JPPIPA 9(12) (2023)

Jurnal Penelitian Pendidikan IPA

Journal of Research in Science Education

http://jppipa.unram.ac.id/index.php/jppipa/index

Content Analysis of YouTube Videos Knowledge of Biology for Class XI SMA on the GIA Academy Channel

Muyassaroh[1], Slamet Suyanto[1*]

[1]Educational Research and Evaluation, Yogyakarta State University, D.I. Yogyakarta, Indonesia.

Received: August 31, 2023
Revised: November 22, 2023
Accepted: December 15, 2023
Published: December 31, 2023

Corresponding Author:
Slamet Suyanto
muyassaroh.2022@student.uny.ac.id

DOI: 10.29303/jppipa.v9i12.5160

Abstract: This article aims to determine the feasibility of learning YouTube content on the subject of Biology. GIA Academy, which is the subject of research in this article, is a channel that provides explanations on various subjects. This research took a sample of 22 video connections with the criteria for class XI Biology lessons from a total of 117 videos. This research uses a content analysis design with the analysis consisting of 4, namely content, presentation, language, and graphics using Krippendorff Theory (2004) with methods in several stages, namely: unitizing, sampling, recording, reducing, inferring, and narrating. The research results show that the overall feasibility of the GIA Academy video is very good or more than 80% with details in terms of content aspects getting 92.04%, presentation aspects 86.04%, language aspects 98.57% and graphics 99.3%.

Keywords: Content Analysis, Media Appropriateness, Biology Learning Videos, YouTube Learning Media.

Introduction

Education can be seen as a process that is deliberate, planned, designed, and organized based on existing rules, especially laws that are prepared based on community agreement. Article 4 paragraph 1 of Law Number 20 of 2003 regulates that education must be carried out democratically, fairly, and without discrimination against human rights, religious values, cultural values, and socialism, ethnic pluralism. Since then, education has become the country's top priority, educational progress has had an impact on all existing sectors. Quality education is delivered in a variety of ways. One way to develop education is to use learning media that is appropriate to the student's circumstances and conditions. Currently, in the rapidly developing Industry 4.0 era, the role of digital technology and high connectivity has changed the world of learning, including the world of biology. Industry 4.0 means technological development is very rapid and influences many different aspects of learning (Sari & Wilujeng, 2020). The character of Education 4.0, which is synonymous with developments in Internet technology, iCloud, big data, connectivity, and digitalization, encourages teachers to improve learning with these technological developments (Rasyid & Gaffar, 2019).

The development of technology has created various learning media. Learning media according to Gagne and Briggs (Arsyad, 2014) are intermediary components or tools that can stimulate students in the learning process. Where technology provides a new color in education, especially innovative learning media as an alternative for students to learn, not only being creative and using conventional media, both electronic and digital media, digital media is audiovisual media. Audio-visual media is a combination of audio-visual and audio-visual media. According to Semenderiadis (in Putri & Julaikha, 2022), in its application audio-visual media can stimulate students in the learning process. Kustandi (in Putri & Julaikha, 2022) revealed the benefits of audiovisual media in the learning process, namely: a) Can offer new experiences such as discussing, reading, and practicing, b) Increases learning motivation and instills attitudes and other affective aspects, c) Contains values positive values that can develop thinking.

How to Cite:
Muyassaroh, & Suyanto, S. (2023). Content Analysis of YouTube Videos Knowledge of Biology for Class XI SMA on the GIA Academy Channel. *Jurnal Penelitian Pendidikan IPA*, *9*(12), 11935–11942. https://doi.org/10.29303/jppipa.v9i12.5160

Learning videos used in the classroom also have certain eligibility criteria so that the videos used as learning aids can function according to their intended purpose. Learning videos can help teachers convey learning material in class. Learning videos often include information-rich images and sounds intended to increase students' motivation, interest, and curiosity (Susilawati, Rahmana, Kasim, & Muliyadi, 2022). Of course, this is very beneficial for teachers because it helps reduce workload and saves time when teaching in class.

Like any instrument in the world of education, of course, a learning media has standards that must be appropriate. Learning video media standards refer to an assessment of the extent to which videos can be used as effective and useful learning tools (Arifa, Widiyatmono & Jumadi, 2023). Learning videos are considered appropriate if they meet certain criteria. Previous research conducted by Yuwono, Yuliana, and Munif (2023) shows that content analysis of learning videos can be done by analyzing 4 aspects of the video, Makki and Musaddat (2022) explain a little about these assessment aspects. Presentation relevance is a systematic and comprehensive presentation technique that includes images, illustrations, and symbols. Linguistic appropriateness is the appropriateness of language development at the student level and the use of language that is logically structured and integrated. Graphic feasibility is a feasibility that refers to the standard cover size, video design, and attractive content layout.

One of the learning media in the form of videos, which can currently be used to expand knowledge, is YouTube. YouTube is a platform for downloading and viewing videos that contain various types of information and can be viewed at any time with adequate internet access (Sari, 2020). In the world of education, YouTube was developed as an educational medium (Mujianto, 2019). For YouTube to continue to grow, the number of subscribers, video concepts, and impressions created must be consistent (Labas & Yasmine, 2017). The packaging concept must be attractive so that students pay attention to the topic being broadcast (Indarti & Arcana, 2019).

Apart from having to be interesting, of course, as has been stated previously, learning media must have suitability standards, this is because not all of the videos on YouTube can be used as learning media, it could be because they are not suitable or because there is a mismatch in video quality (Richtberg & Girwidz, (2019). For this reason, teachers have a role in being able to provide channel recommendations that suit learning needs. So this video analysis research aims to ensure that YouTube videos submitted by GIA Academy can determine their suitability and whether they comply with the standards required in the Biology subject.

Biology is a subject that studies the introduction of nature systematically, so biology is not just mastering a collection of knowledge in the form of facts, concepts, or principles, but is also a process of discovery. Learning must be a way for students to find out more about themselves and their natural environment, as well as prospects for further development in applying it in everyday life (Pangestuningsih, 2017). With the help of technology, it certainly makes it easier for teachers to convey biology, apart from the fact that videos can convey lots of interesting images as the content of biology is full of pictures, they can also convey well how biological knowledge interacts in everyday life.

The subject of this research, the GIA Academy YouTube channel, has 112,000 subscribers with a total of 117 videos. This channel explains various subjects for elementary, middle, and high school, most of which are related to natural sciences, for high school there are Biology, Chemistry, Physics, and Mathematics subjects, apart from that there are also B. English subjects. GIA Academy joined YouTube on July 20, 2020, and so far there have been 7,861,859 viewers. Researchers are interested in the GIA Academy channel because the delivery and from the editor's perspective is unique and relaxed, so of course there are many viewers in each video.

Method

Content analysis is a study that includes an in-depth discussion of the content of written or printed information in the mass media. As carried out by Arifa (2023), content analysis is suitable for using qualitative research methods (Sugino, 2014) to determine the suitability of videos by analyzing four aspects, namely content analysis, presentation analysis, language analysis, and graphic analysis.

The theory introduced by Krippendorff (2004) uses content analysis methods in several stages, namely: unitizing, sampling, recording, reducing, inferring, and narrating. Unitizing is the initial stage for determining the video aspect data that will be analyzed. Unitizing is the first step in determining which aspect of the video data will be analyzed. Then the sampling step is to determine the research sample. Next is recording to record sample data according to the specified aspects. The next step is reducing, namely filtering and simplifying the data so that it is easy to understand. Then we have to make inferences or draw conclusions. Finally, the narrating is asked to explain the conclusions of the content analysis of physics learning videos (Azizah, Maryani, 2021)

Of the 117 videos available at GIA Academy, the researcher took 22 samples that were by the researcher's

objectives, where the videos contained explanations of class XI biology knowledge. The selection of content for class So the researcher assumes that analyzing class XI content is more relevant to research by adjusting the situation and conditions of the existing curriculum at school.

Table 1: Biology Learning Video Information from the GIA Academy Youtube Channel

Title	Upload Date	Access Link
Biology Class 11 History of Discovery & Components of Cells	09/08/2020	https://www.youtube.com/watch?v=CGRW_AMo3ZA
Class 11 Biology Circulatory System (Part 1)	24/10/2020	https://www.youtube.com/watch?v=dxRESjSNKV8
Class 11 Biology Circulatory System (Part 2)	16/11/2020	https://www.youtube.com/watch?v=_66IMzckF2E
Class 11 Biology Human Excretory System	15/02/2021	https://www.youtube.com/watch?v=N6oly45yK6A
Class 11 Biology Coordination Systems (Nervous & Hormonal)	13/04/2021	https://www.youtube.com/watch?v=e7gcSNlS_zg
Biology Class 11 Cell Structure and Organelles	17/07/2021	https://www.youtube.com/watch?v=Xxm6xtjsFx0
Biology Class 11 Cell Bioprocesses (Membrane Transport)	07/08/2021	https://www.youtube.com/watch?v=vDFBJmSH4fs
Biology Class 11 Cell Bioprocess (Protein Synthesis & Cell Reproduction)	15/08/2021	https://www.youtube.com/watch?v=pBzYZA12Kdk
Class 11 Biology Plant Tissue Structure	02/09/2021	https://www.youtube.com/watch?v=f7uAhLJba6g
Class 11 Biology Tissues that Makeup Plant Organs	04/09/2021	https://www.youtube.com/watch?v=G3RcGuBIe7I
Biology Class 11 Animal Tissues (Part 1)	19/09/2021	https://www.youtube.com/watch?v=MPxXk2OGvSc
Class 11 Biology Animal Tissues (Part 2)	29/09/2021	https://www.youtube.com/watch?v=eSMysnjPD8I
Biology Class 11 Food Substances	11/10/2021	https://www.youtube.com/watch?v=eGV2AAfvG-A
Class 11 Biology Human Digestive System	20/10/2021	https://www.youtube.com/watch?v=N0PS9OpNgvo
Class 11 Biology Digestive System Disorders	26/10/2021	https://www.youtube.com/watch?v=tG7ACQA_tvg
Biology Class 11 Human Movement System (Part 1)	10/11/2021	https://www.youtube.com/watch?v=sZFCYvLwsVk
Biology Class 11 Body Defense Systems (Part 1)	14/03/2022	https://www.youtube.com/watch?v=aEqiCz00_Zs
Class 11 Biology Tube Defense System (Part 2)	23/03/2022	https://www.youtube.com/watch?v=kWgHHlzOJ1Q
Class 11 Biology Respiratory System	15/11/2022	https://www.youtube.com/watch?v=mqwj6eqIyuA
Biology Class 11 Coordination System (Sense System)	18/02/2023	https://www.youtube.com/watch?v=dfZRbsVrd9M
Class 11 Biology Reproductive System (Part 1)	25/02/2023	https://www.youtube.com/watch?v=0QpjmNAsjow
Class 11 Biology Reproductive System (Part 2)	04/03/2023	https://www.youtube.com/watch?v=k4eGPKSo-oQ

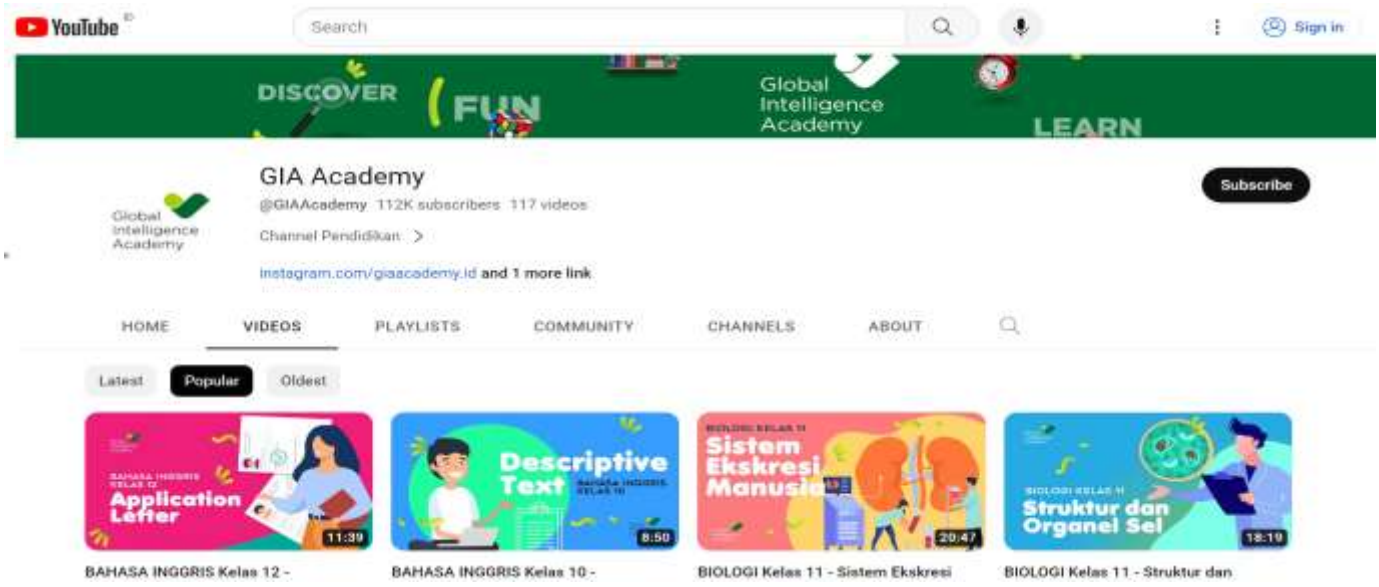

Figure 1. GIA Academy Channel Front Page

Video learning is considered feasible if the predetermined aspect indicators are met. These include: (1) Content analysis includes indicators of the relevance of the material to the curriculum, the relevance of the material, the suitability of examples and situations, the suitability of the use of images, words and phrases, graphs, illustrations to everyday life; (2) Presentation analysis metrics include systematic consistency in presentation, concept consistency, presentation of examples and questions, the relevance of required information, and consistency of presentation, clear tone of voice when communicating; (3) Linguistically, a video is said to be appropriate if it meets the overall vocabulary, effectiveness of sentences, use of sentences, consistency of word use, and use of words in a standard language; (4) Graphic aspects have indicators such as suitability of image to material, suitability of image to video ratio, ability to represent material, image contrast and video resolution (Cahyana & Kokasih, 2020).

Research data was collected using a Likert scale. The formula for calculating the percentage is as follows:

$$Xi = \frac{\sum S}{S_{max}} x\ 100\% \quad (1)$$

Des:
Smax = Maximal Score
$\sum S$ = Total Score
xi = Questionnaire feasibility value for each aspect

Table 2. Scoring Rules

Category	Score
Very Good	5
Good	4
Fair	3
Less	2
Very Poor	1

The percentage score results obtained from the research are interpreted in the criteria of Table 3.

Table 3. Learning Media Feasibility Scale

Percentage	Criteria
81%-100%	Very Worth It
61%-80%	Worthy
41%-60%	Fairly Decent
21%-40%	No Worth It
0%-20%	Very Less Worthy

The percentage analysis feasibility criteria table is used as a reference to see the percentage of product trials. categorized as very feasible if X > 81%; feasible if 61% < X ≤ 80%; Sufficient if 41% < X ≤ 60%; Less if 21%< X ≤ 40% and Very Less if X ≤ 20% (Asyhari & Silvia, 2016).

Result and Discussion

Overall, in the 22 samples of biology knowledge videos as listed in table 1, there is a description of the video title, upload date along with an access link to visit the sample video which is very suitable to be used as a learning medium for biology subjects, which can increase insight and understanding apart from learning in the classroom. This evidence can be seen in table 4 below:

Table 4. Overall Feasibility Analysis Results

Analysis Aspects	Average Percentage (%)	Category
Content Analysis	92.04	Very Worthy
Presentation Analysis	86.04	Very Worthy
Language Analysis	98.57	Very Worthy
Graphic Analysis	99.3	Very Worthy

From the results above it can be seen that the highest feasibility indicator from the results of content analysis was obtained by graphic analysis with a percentage of 99.3%, this is because GIA Academy presents videos with good image suitability for the material, or it could be said to be very good, the animation presented is by what conveyed by the narrator, the suitability of the image to video ratio is very good, the narrator's ability to represent the material is very good, and the image contrast and video resolution are very decent. In biology material which presents lots of interesting pictures and animations, graphic analysis is of course very important, because if the pictures presented are less attractive it will affect students' understanding.

The next feasibility analysis was language which got 98.5%, the language used by the narrator was very good, where the narrator not only explained the material, there were also greetings and the language used was appropriate for the age of high school students, not too formal but still standard, the language used It doesn't bore listeners even though it can be said that the duration of one video is quite long.

Content analysis is in the appropriate category, even though it is not in the superior category. The content in the video meets the knowledge requirements of class XI, however, because the duration used cannot accommodate too much material, several discussions are made into two videos, this is what causes the presentation analysis to get a feasibility assessment of 86.04%, because in the presentation of each sub-chapter there are also 2 videos in 1 video, although they are still in the very worthy category.

Content Aspect Analysis

Based on the data above, of the 22 videos that have been analyzed, they received a very worthy category with all percentages above more than 80%, GIA Academy presents very interesting videos and understands how to convey the content, such as the narrator's delivery with various contexts accompanied by animations that are by the curriculum which, in each video, is explained first before the video is played, what the previous video conveys, how it relates to the video that will be discussed, and how to understand aspects of daily activities.

Table 2. Content Analysis Eligibility Percentage

Video	Percentage (%)	Category
1	92	Very Worthy
2	92	Very Worthy
3	93	Very Worthy
4	98	Very Worthy
5	95	Very Worthy
6	97	Very Worthy
7	92	Very Worthy
8	90	Very Worthy
9	89	Very Worthy
10	89	Very Worthy
11	89	Very Worthy
12	90	Very Worthy
13	96	Very Worthy
14	91	Very Worthy
15	90	Very Worthy
16	91	Very Worthy
17	95	Very Worthy
18	90	Very Worthy
19	92	Very Worthy
20	89	Very Worthy
21	93	Very Worthy
22	93	Very Worthy
Average	92.04	Very Worthy

Figure 2. Video screenshot results show the content aspect

The picture 2 shows how humans need to digest food and drink, then the excretory system is explained as a form of response to the excretion process from the body, how the process is done, and its form is also explained. The narrator also explains the impact if it doesn't run smoothly. This is what makes the content of GIA Academy can be said to be very worthy in terms of content. As explained by Indarti and Arcana (2019), the packaging concept must be attractive so that students pay attention to the topic being broadcast. GIA Academy fulfills this and can be used as a viewing recommendation by teachers for students.

Analysis of Presentation Aspects

Table 3. Percentage of Feasibility of Presentation Analysis

Video	Percentage (%)	Category
1	90	Very Worthy
2	76	Worth It
3	78	Worth It
4	95	Very Worthy
5	90	Very Worthy
6	95	Very Worthy
7	85	Very Worthy
8	78	Very Worthy
9	95	Very Worthy
10	85	Very Worthy
11	78	Worth It
12	76	Worth It
13	90	Very Worthy
14	90	Very Worthy
15	85	Very Worthy
16	95	Very Worthy
17	90	Very Worthy
18	90	Very Worthy
19	90	Very Worthy
20	90	Very Worthy
21	78	Worth It
22	78	Worth It
Average	86.04	Very Worthy

Of the 22 videos above, 6 videos are in the decent category and 16 videos are in the very worthy category, this is influenced by one sub-material that is presented in two videos. On the other side, of course, a video with a duration that is not too long is good, but if it affects consistency in delivery it will confuse the audience. As stated by Labas & Yasmine (2017) For YouTube to continue to grow, the number of subscribers, the video concept, and the impression created must be consistent. GIA Academy is conceptually good but for consistent upload times, it is a little irregular.

This is very influential if the sub-material is the same but the timepieces are far apart. As in videos number 2 and 3 related to blood circulation material, video 2 was uploaded on 24 Oct 2020 while video 3 was dated 16 Nov 2020, a distance of 22 days. GIA Academy explains that it's not just one subject so it's natural that upload times are inconsistent. Even so, the concepts presented are very suitable to be used as learning media.

Figure 3. The results of the video screenshots show the presentation aspect

Figure 4. The screenshot results show the language aspect.

Analysis of language aspects

Table 4: Percentage of Eligibility for Language Analysis

Video	Percentage (%)	Category
1	99	Very Worthy
2	98	Very Worthy
3	99	Very Worthy
4	100	Very Worthy
5	96	Very Worthy
6	100	Very Worthy
7	100	Very Worthy
8	98	Very Worthy
9	100	Very Worthy
10	95	Very Worthy
11	100	Very Worthy
12	98	Very Worthy
13	100	Very Worthy
14	98	Very Worthy
15	100	Very Worthy
16	96	Very Worthy
17	99	Very Worthy
18	98	Very Worthy
19	98	Very Worthy
20	100	Very Worthy
21	98	Very Worthy
22	98	Very Worthy
Average	98.57	Very Worthy

Linguistically or in video language, it is said to be appropriate if it meets the overall vocabulary, effectiveness of sentences, use of sentences, consistency of word use, and use of words in standard language (Cahyana & Kokasih, 2020).

Of the 22 videos presented by GIA Academy, all of them are very worthy, because the language used is standard in delivery but does not bore the listener, the language conveyed by the narrator also follows the animation and content in the video, so the combination created is interesting and beautiful to look at. Like the paragraph below, the language used is standard but not boring.

Graphic Aspect Analysis

Table 5. Percentage of Feasibility for Graphical Analysis

Video	Percentage (%)	Category
1	100	Very Worthy
2	100	Very Worthy
3	97	Very Worthy
4	100	Very Worthy
5	100	Very Worthy
6	98	Very Worthy
7	100	Very Worthy
8	99	Very Worthy
9	98	Very Worthy
10	100	Very Worthy
11	100	Very Worthy
12	99	Very Worthy
13	99	Very Worthy
14	100	Very Worthy
15	100	Very Worthy
16	100	Very Worthy
17	99	Very Worthy
18	99	Very Worthy
19	100	Very Worthy
20	99	Very Worthy
21	99	Very Worthy
22	99	Very Worthy
Average	99,3	Very Worthy

The suitability of the images to the material in all the videos is very good, the ratio of the images to the videos is good and can be adjusted by the audience, and the concept and ability of the narrator in representing the material is very good, the contrast of the images and animations in the videos also motivate so that you don't get bored while studying. As stated by Kustandi (in Putri & Julaikha, 2022) good graphics will increase student motivation as students.

Figure 5. The screenshot results show the graphic aspect.

Conclusion

Based on the analysis of the video content of the findings and discussions, it was determined that the 22 GIA Academy videos in the Biology subject for class XI as a whole were very suitable for use. In terms of content aspect, it got 92.04%, presentation aspect 86.04%, language aspect 98.57% and graphics 99.3%. Of all aspects, graphics are the aspect with the highest category level due to the video production with very good image quality, animation, and the GIA Academy concept. The lowest aspect is the presentation aspect, which is influenced by the sub-material which is conceptualized with 2 videos, there is quite a long upload time gap, so of course the consistency is reduced. With the results of this analysis, it can be ascertained that YouTube videos with loyal GIA Academy viewers are needed in the learning process, as well as being an alternative for educators to gain additional knowledge outside of school. Apart from that, this Biology learning video can provide more motivation for students in learning, as well as provide an understanding that Biology is fun.

Author Contributions
All authors contributed to writing this article.

Funding
No external funding.

Conflicts of Interest
All authors declare no conflict of interest. We report no financial or any other conflicts of interest in this work.

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