Science Learning through YouTube Channell

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Abstract. Teachers' needs for learning media in the form of video is very important, resulting YouTube becomes one of the options in assisting students for studying. This research identifies videos of science lesson materials displayed in YouTube channel. Data in YouTube documents were analyzed using data crawling, pre-processing, and video classification based on Biology, Physics, and Chemistry group. Research samples were taken from the most favorite of five YouTube learning channels from a survey of saintif.com site. Research finding shows that the numbers of Biology video lesson materials are much greater compared to Physics and Chemistry lessons. Lesson material content displayed is not equally distributed yet according to the necessity of every educational level, even the lesson material tends to be the same in each channel. It requires more videos that can explain the abstract lessons those are difficult in the class.

1. Introduction

The progress of science and technology affect positively toward education development. Information technology and communication give easiness for teachers and students in obtaining the latest information. Information on *www.youtube.com* site, also known as YouTube, is a site that is widely utilized by teachers to obtain additional information through internet network connection. YouTube was made and active in 2005 by Chad Hurley, Steve Chen, and Jawed Karim that can present various video contents, also the facility to upload videos is easily can be done by the internet users.

Millennial generation expects information technology and communication that is integrated with learning process in the class because it has tangible advantages [1][2].Through information technology integration, students have informal space to communicate as well as entertainment that is easily to get [3][4].Through information technology and communication, it is expected that learning activities become easier because it can ease the teachers' duty, and students will be easier in understanding difficult lessons better than if it is only taught by lecturing method.

The advantages of YouTube in the learning process at class are shortening lesson in order to make it easy to be comprehended, simplifying complex phenomenon, concreting abstract concept, making model, deeper concept exploration, laboratory experiment, understanding theory form sciences history. [2] YouTube advantages have been studied in various researches, such asAlmobarraz that determined YouTube utilization as information source to support learning in the courses in University of Saudi Arabia. [5] Szeto and Cheng determined information and communication technology tool and YouTube for teaching during students' teaching practice in Hong Kong. [6] Albahlalinvestigated the benefit of YouTube in improving speaking skill of the students in secondary school in Riyadh [7]. Maziriri et al. studied about students' perception in utilizing YouTube for tutorial in the class[8] .Iwantara et al. found that students' motivation in learning Natural Science is better compared to real media and Charta [9]. Those studies show that the usage of YouTube can be as a tool for students to comprehend better in lesson learning.

Various types of videos with science content are displayed in YouTube those are come from domestic or abroad, starting from video about animal, plant, space, water, virus, bacteria, etc. Teachers only need to know well about the popular YouTube channels that can be used in the class. There are various YouTube channels made by Indonesian YouTuber those present videos related with learning materials for students. Unfortunately, all of the videos are mixed up with other content videos, so the teachers need to find and select videos which are appropriate to be taught in the class.

Saintif site (*https://saintif.com/channel-youtube-edukasi/*) sorts 18 best-selling YouTube education channels based on their subscribers, which are *Kok Bisa?, Quipper, Hujan Tanda Tanya, Ruangguru, DW Indonesia, Zenius Education, Sains Bro, Kamu Harus Tahu!,YufidEDU, Ayo Mikir, Arsypedia, Yeiy Animation, Nous id, Tanya-tanya.com, SmarterIndo, InstitutTeknologi Bandung, Mau Tau Banget, Makin Pandai*. Through this research, it is examined 5 most favorite YouTube contents which are relevant with Science lessons, so it can help teachers to find YouTube video channels in accordance with materials they want.

2. Method

The research used descriptive qualitative method on video documents in YouTube Channel with Natural Science learning content made by Indonesian YouTuber. Video analysis was carried out toward five most subscribers of YouTube channels dated in 23rd of May 2020. After the videos were obtained, it was categorized into biology, physics, and chemistry groups. Analysis steps are displayed in the following figure 1.
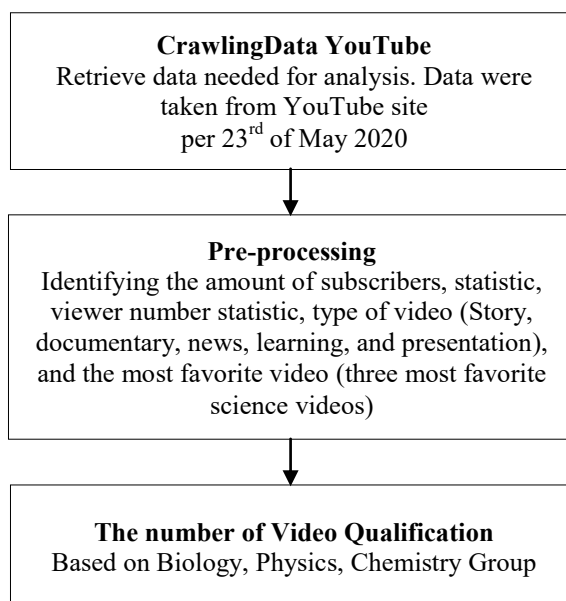
CrawlingData YouTube
Retrieve data needed for analysis. Data were taken from YouTube site
per 23rd of May 2020

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Pre-processing
Identifying the amount of subscribers, statistic, viewer number statistic, type of video (Story, documentary, news, learning, and presentation), and the most favorite video (three most favorite science videos)

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The number of Video Qualification
Based on Biology, Physics, Chemistry Group

Figure 1. Stages of Research and DataAnalysis

3. Result and Discussion

Information data from Saintif site (*https://saintif.com/channel-youtube-edukasi/*), there are 18 favorite YouTube channels that have education content, which is *Kok Bisa?* (2,14 million subscribers), *Quipper* (397 thousand subscribers), *Hujan Tanda Tanya*(371 thousand subscribers), *Ruangguru* (719 thousandsubscribers), *DW Indonesia* (331 thousandsubscribers), *Zenius Education* (204 thousandsubscribers), *Sains Bro*(83,6 thousandsubscribers), *Kamu Harus Tahu!* (88,2thousandsubscribers), *YufidEDU* (176 thousandsubscribers), *Ayo Mikir* (98,7 thousandsubscribers), *Kenapa?* (72,2 thousandsubscribers), *Yeiy Animation* (55,4 thousandsubscribers), *Nous id* (51,2 thousandsubscribers), *Tanya-tanya.com* (48,4 thousandsubscribers), SmarterIndo (55,5 thousandsubscribers), *Institut Teknologi Bandung* (71,9 thousandsubscribers), *Mau Tau Banget* (43,9 thousandsubscribers), and *Makin Pandai* (not active).

YouTube channels rank with five most subscribers are *Kok Bisa?, Ruangguru, Quiper, Hujan Tanda Tanya,* and *Zenius Education,*those are seen in table 1.

Table 1. The Five Most Viewers of the YouTube Science Video Channel

No	Channel name and description	Video type	Number of videos	Three Most Favorite Science Video
1	*Kok Bisa?* (https://www.youtube.com/channel/UCu0yQD7NFMyLu_-TmKa4Hqg) Created in 2015, dominated by videos answering questions about everyday life, 2,14 million subscribers	Cartoon Animation	Biology: 101 Physics: 53 Chemistry: 0	*Apakah ada ujung alam semesta?* (5,3 million views) *Kenapa perjalanan pulang terasa lebih cepat?* (3,4 million views) *Seberapa tinggi kita bisa mendirikan bangunan?* (3 million views)
2	*Ruangguru* (https://www.youtube.com/channel/UCbc1RY0McnikiEMD8Box5Ig) Created in 2013, dominated by presentation videos and practice questions by the teacher, 719 thousand subscribers	Presentation of material and discussion of questions	Biology: 17 Physics: 11 Chemistry: 6	*IPA V SD: Rangka manusia* (466 thousand views) *IPA IV SD: Bagian tubuh hewan dan tumbuhan* (416 thousand views) *Biologi SMA XII: Pertumbuhan dan perkembangan Tumbuhan* (252 thousandviews)
3	*Quiper* (https://www.youtube.com/user/QuipperApp) Created in 2012, dominated by presentation videos and practice questions by the teacher, 397 thousand subscribers	Presentation of material and discussion of questions	Biology: 16 Physics: 19 Chemistry: 15	*Fisika: Rumus super masa jenis* (453 thousand views) *IPA: Fisika cahaya dan optik SMP* (409 thousand views) *Fisika hukum Newton* (404 thousand views)
4	*Hujan Tanda Tanya* (https://www.youtube.com/channel/UC5dn6JdeSgWzcNL7NuvMEKQ) Created in 2016, dominated by motivational presentation videos and learning tricks, 371 thousand subscribers	Teacher presentations, motivational lectures and learning tricks	Biology: 9 Physics: 9 Chemistry: 2	*7 Tips belajar Matematika dan IPA yang ampuh* (627 thousand views) *7 konsep fisika untuk memahami cinta* (111 thousand views) *Otak kita seperti plastik* (101 thousandviews)

| 5 | *Zenius Education*(https://www.youtube.com/user/ZeniusEduChannel**)** Created in 2013, dominated by motivational presentation videos and learning tricks, 204 thousand subscribers | Teacher presentations, motivational lectures and learning tricks | Biology: 26 Physics: 11 Chemistry: 5 | *Biologi SMA: Sistem eksresi* (215 thousand views) *Kisah penyelamat Bumi dari Sampah* (214 thousand views) *Tips belajar Biologi* (190 thousand views) |

YouTube site is already known well by the people. Almost every student has accessed YouTube video [10].This is also shown from the viewer number of learning video with the most subscribers position, that is, *Kok Bisa?*.A large number of channel*Kok Bisa?* Subscribers shows how the society is attracted toward the learning videos presented.

Videos on channel *Kok Bisa?*are animated cartoon type of videos in the form of simple answer of question in the daily life. For instance, *tomat:buah atau sayur?, jarak matahari ke Bumi?, hidup tanpa tidur*, etc. Video type with animated cartoon is more often viewed by audience than other types of video. Videos displayed in *Ruangguru, Quiper, Hujan Tanda Tanya,* and*Zenius Education* are types of presentation lesson video and exercises discussion by the teachers. The viewers of lesson material in YouTube seek different scenery with the learning situation the class [10]. If the video presented looks the same with the way of teaching in the class, then the attraction will decrease [11].Video that is looked stiff in explaining material has not many viewers. On the contrary, video using 3D cartoon concept and simple language has much more viewers.

Videos uploaded in YouTube channel are still mixed up with other videos contents which are not the lesson material. For instance, it is mixed with motivation lecture, commercial, or testimony video. In channel *Kok Bisa?*,the video content displayed is more consistent in the answers to daily problems related to the subject matter, than *Ruangguru, Quiper, Hujan Tanda Tanya, and Zanius Education*that make other types of video such as: lecture motivation, trick, and strategy in continuing study, etc. Types of video displayed by those four channels, besides channel *Kok Bisa?*, have not been consistent yet in displaying type of video.

Related with science content video, the number of biology, physics, and chemistry lesson material videos are very varied. Portion numbers of the three videos are not same. The numbers of biology lesson material videos are more than physics and chemistry lessons.

Biology Content

Video content with Biology material dominates the number of science videos presented on five YouTube channels as seen in table 2. The most biological content is on the channel *KokBisa?*,however biology content has not become the most favorite viewed yet. Instead, Physics video material is more favorite, namely; *Apakah ada ujung alam semesta?* (5,3 million views), *Kenapa perjalanan pulan terasa lebih cepat?* (3,4 million views), dan *Seberapa tinggi kita bisa mendirikan bangunan?* (3 million views). Description on biology lesson material at the sample channel is presented in table 2.

Table 2. Three of the most Interesting BiologyVideos

Channel Name	Video Title	Number of Viewers	Video Content Description
Kok Bisa?	Misteri apa yang ada di laut terdalam?	2,7 million viewers	Explanation of the living conditions of the biota in the deepest seas
	Apakah ada kehidupan lain di luar Bumi?	2,3 million viewers	Explanation of the possibility of other life in the universe
	Seberapa lama kita bisa tahan enggak tidur?	2,2 million viewers	Explain the need for sleep to work the brain and the causes of insomnia
Ruangguru	IPA V SD-Rangka Manusia	466thousand viewers	Description of the skeleton and the names of the bones that make up the human skeleton
	IPA IV SD-Bagian Tubuh Hewan dan Tumbuhan	416thousand viewers	Explanation of the names of animal and plant organs and their functions
	Biologi XII SMA-Pertumbuhan dan Perkembangan Tumbuhan	252thousand viewers	Explanation of differences in plant growth and development
Quiper	IPA – Pengelompokan Makhluk Hidup	322 thousand viewers	Explanation of the grouping of vertebrate and invertebrate animals
	Biologi Kelas 12	189 thousand viewers	Explanation of factors affecting plant growth and development
	Biologi - Pertumbuhan dan Perkembangan Tumbuhan	157 thousand viewers	Explanation of differences in growth and development
Hujan Tanda Tanya	Otak Kita Seperti Plastik?	102thousand viewers	Explanation of how the human brain works
	Mitos Seputar Kecerdasan	92thousand viewers	Explanation of the differences in intelligence of the left brain and right brain
	Perbedaan Ahli dan Pemula	88 thousand viewers	Explanation of the greatness of the brain's work
Zenius Education	Sistem Ekskresi Manusia	215thousand viewers	Explanation of differences in excretion and secretion
	Sistem Pernapasan Manusia	185thousand viewers	Explanation of human respiratory organs and the process of breathing
	Struktur dan Fungsi Jaringan Tumbuhan	182thousand viewers	Explanation of plant tissue that is specialized in tissue at the root

Physics Content

Physics content displayed is more dominated by video on discussing the physics formula, laws of physics, and Earth-Space. Physics content lessons displayed in five YouTube channels are presented on table 3.

Table 3. Three of the most Interesting PhysicsVideos

ChannelName	VideoTitle	Number of Viewers	Video Content Description
Kok Bisa?	Apakah Ada Ujung Alam Semesta?	5.4million viewers	A description of the solar system and galaxies
	Seberapa Tinggi Kita Bisa Mendirikan Bangunan?	3million viewers	Explanation of the maximum height of building construction that can be built and its supporting technology
	Kenapa Pluto Tidak Lagi Dianggap Sebagai Planet?	2,5 million viewers	Explanation of the factors that caused Pluto was not a type of planet
Ruangguru	Fisika IX SMP - Listrik Dinamis	197thousand viewers	Explanation of the formula for electric current strength
	Fisika VII SMP – Definisi Kalor	171 thousand viewers	Explanation of the definition of heat and the difference with temperature
	Fisika XII SMA - Hambatan Listrik	130 thousand viewers	Explanation of Ohm's Law (strong electric current)
Quiper	Fisika - Rumus Super Masa Jenis	453 thousand viewers	Explanation of how to memorize specific gravity formulas easily
	IPA Fisika-Cahaya dan Optik	410 thousand viewers	Discussion of national examination questions on light and optical material
	Fisika - Hukum Newton	405 thousand viewers	A description of Newton's law of gravity and Kepler's law
Hujan Tanda Tanya	7 Konsep Fisika untuk Memahami Cinta	111 thousand viewers	Explanation of physical laws related to feelings of love
	Inspirasi dari Stephen Hawking	73 thousand viewers	An explanation of Black Whole based on Stephen Hawking's idea
	Kenapa Banyak Gunung Api dan Gempa Bumi di Indonesia?	57 thousand viewers	Explanation of Plate Tectonic theory
Zenius Education	Persamaan Bernoulli	94 thousand viewers	Explanation of the Bernoulli formula
	Konsep Fisika	83 thousand viewers	An explanation of how to study Physics and the scope of physics
	Gerak Lurus	2,4 thousand viewers	An explanation of the straight-motion formula

Chemistry content

Chemistry content is the least video lessson content uploaded in YouTube compared to video about physics and biology. Even in channel *KokBisa?,* there is non-chemistry content. Chemistry lesson contents displayed in the five YouTube channels are presented on Table 4.

Table 4. Three of the most InterestingChemistryVideos

Channel Name	VideoTitle	Number of Viewers	Video Content Description
Kok Bisa? (No videos available)			
Ruangguru	*Kimia XII SMA - Pendahuluan Sifat Koligatif*	187 thousand viewers	An explanation of the coligative characteristic of the solution
	Meniup Balon dengan Ragi	143 thousand viewers	Demonstration of the fermentation process
	Perbedaan Larutan Homogen dan Heterogen	21 thousand viewers	A description of the types of solutions
Quiper	*Tatanama Senyawa 1*	302 thousand viewers	Explanation of exercises about chemical compounds (covalent, ionic)
	Konfigurasi Elektron	274 thousand viewers	Explanation of atomic number and atomic shell configuration
	Teori Atom - Kimia	267 thousand viewers	Explanation of various atomic theories
Hujan Tanda Tanya (only two videos)	*Mencoba Mencampur Larutan Kimia*	4,8 thousand viewers	Explain the characteristics of chemical reactions
	Kuis: Air Membeku Volumenya Berkurang atau Bertambah ya?	5,8 thousand viewers	Chemistry quiz to be answered by viewers
Zenius Education	*Sifat Koligatif*	75,6 thousand viewers	An explanation of the physical properties of the solution
	Stoikiometri	4,5 thousand viewers	An explanation of the process by which a chemical reaction occurs
	Laju Reaksi	1,3 thousand viewers	Introduction to chemical reactions (definitions and factors that influence reactions)

Science contents presented in all of the sample channels have not been proportional yet; it is still dominated by biology lesson material. The number of Chemistry lesson material is very limited compared to Physics and Biology. This shows that science content is still very limited, such as science experiment [2][12].Video creators need to consider the aspect of user's necessity, besides prioritizing on the amount of the subscribers. Physics is still considered as hard lesson and causes stress because of formula difficulty, added with unpleasant teaching method [13][14].This issues need to become reference for YouTube video creators to make science material more easily understood and pleasing to students.

Video is needed by students to make the material more concrete [2]. The teacher's ability to make videos is very limited so that YouTube videos can be downloaded for learning media. Based on various studies, videos can increase student learning interest [8] [9] [12].

4. Conclusions

Based on the research findings, the most learning videos displayed by YouTube learning channel is Biology material videos. The number of videos on Biology, Physics, and Chemistry does not proportional yet. Even Chemistry material has not been found in one of YouTube channels. The theme of the material displayed does not yet represent the material at each level of education or class, even the materials tend to be the same among YouTube channels. This can be a reference for YouTubers to create videos that ease the students to understand abstract material. Further studies that need to be done are to examine the misconception of the material displayed on learning videos in YouTube.

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