***Original Research Article***

# The Potential of YouTube as a Source of Mathematics Learning Education


## ABSTRACT

The rapid progress in technology and information has facilitated the integration of computer-based technology into the realm of education. the incorporation of computer technology as an instructional tool or educational resource. Indeed, a plethora of educational resources are readily available on the internet in the form of electronic learning (e-learning). The predominant format of content in e-learning platforms is textual, which poses challenges for students in comprehending mathematical concepts due to the nature of mathematical material that often involves detailed explanations of problem-solving procedures. Due to this rationale, instructional materials presented in the format of videos serve as a viable substitute for textual media. The educational videos that have been produced can be published on online platforms dedicated to video sharing, such as YouTube. The objective of this study is to assess the viability of YouTube as an educational resource for mathematical education. The present study employs a qualitative descriptive methodology, wherein the researcher assumes the role of the primary instrument. The study involved an examination of mathematics learning materials that were released by various channels on the YouTube platform. Additionally, interviews were performed with mathematics educators and high school students to gather their perspectives on the use of YouTube as a resource for studying mathematics. The findings of the study indicate the existence of YouTube channels that offer mathematics educational content suitable for student learning purposes. Based on interviews conducted with mathematics educators and students, it is evident that YouTube has the potential to serve as a viable platform for mathematical education. However, it is crucial to acknowledge and evaluate the various advantages and disadvantages associated with its use in this context.


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*Keywords: e-learning, educational, YouTube*, *channels*


## 1. INTRODUCTION

According to available data from 2012, over 22% of the population in Indonesia were identified as internet users [1], [2]. Projections suggest that this percentage will experience a consistent annual growth rate in subsequent years [3]. Online learning can be employed in the field of education. According to scholarly study, the utilization of online learning platforms has the potential to foster more independence among students [4]. Hence, there is a necessity for the provision of online learning resources in the form of e-learning. E-learning possesses numerous advantages in comparison to conventional learning methods [5]. When studying mathematics, the curriculum includes acquiring knowledge and requires a comprehensive explanation of each procedural step involved in solving a mathematical problem. If transcribed into textual format, this explanation would cover many pages [6]. As a study shows, video allows condensing information into short segments [7].Based on the

statement above, e-learning in mathematics education is mainly realized in video presentation media. Mathematics learning resources in the form of educational films can be easily distributed via the Internet, making it possible for students to learn online [8]. YouTube is a leading online platform that facilitates video sharing, allowing users to upload, view, and distribute videos [9]-[12]. According to these sources, YouTube is a platform where users can freely upload and distribute videos, attracting millions of viewers daily [13]-[16]. YouTube, a video-sharing website, has experienced a significant surge in popularity since its founding in 2005. According to available data, YouTube experienced a substantial increase in views and user-generated content in the first five years after its introduction. Specifically, the platform collects over 2 billion daily views, while users actively upload videos at more than 35 hours per minute [17]-[19]. Several studies have provided evidence supporting the usefulness of YouTube in various fields [20].YouTube is a valuable resource in various academic fields, including nursing and the acquisition of English as a second language, among others [21], [22]. The use of YouTube in the educational realm is a development that has been around for a while. Using YouTube as a teaching tool has attracted great interest in efforts to optimize educational practices. In March 2009, YouTube announced the introduction of YouTube Edu, a compilation of channels featuring educational content provided by various educational institutions such as schools and colleges. By the end of the first year, more than 300 educational institutions had successfully uploaded more than 65,000 videos covering lectures, the latest news, and school-related activities. The statements above only represent a small part of YouTube's educational value [23], [24]. This study aims to examine the potential of YouTube as an educational source for mathematics learning among SMA/MA/SMK students and determine strategies for optimizing the effectiveness of YouTube as a mathematics teaching platform.

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## 2. METHODS

This study employs a descriptive qualitative technique. The primary objective of this study is to investigate and analyze YouTube as a potential platform for mathematics education, utilizing studyers as the primary agents of data collection and analysis. The analysis conducted by studyers focused on YouTube channels that engage in discussions about mathematics. The study uses questionnaire indicators developed as a supplementary tool for evaluating video content related to mathematics instruction available on YouTube channels. The channels under investigation in this study include iTuition Indo, Matematika Hebat, and kafe math. This study will involve interviews with five mathematics teachers and 10 SMA/SMK/MA students. These interviews aim to triangulate the data and assess the potential of YouTube as a viable source for mathematics learning among students.

## 3. RESULTS AND DISCUSSION

### 3.1 iTuition Indo YouTube channel

The YouTube channel known as iTuition Indo specializes in producing and disseminating educational videos focused on mathematics. The online educational platform iTuition Indo can be conveniently accessible on the Internet by utilizing the following hyperlink: https://www.youtube.com/@iTuitionindo/videos. In addition to hosting mathematics instructional content, iTuition Indo also provides educational videos about physics. The taxonomic classification and organization of video placement on this channel are commendable. Videos are classified based on the chapter or subject matter they elucidate. Regrettably, the content disseminated through this channel is limited to three specific subjects, namely (1) power forms, roots, and logarithms, (2) functions and quadratic equations, and (3) systems of linear equations in two variables. The iTuition Indo channel has ceased producing and publishing maths study videos. The most recent video was

published in 2021, indicating that the content featured in the film is derived from the KTSP curriculum.Every chapter comprises multiple films, wherein each video elucidates the subject matter and illustrative instances of problem-solving about each sub-chapter within the studied chapter. The videos provided exhibit high precision and systematic organization, facilitating the learning process for students who engage with these instructional materials. Each video contains an instructional presentation by the teacher, wherein mathematical learning material is elucidated through a computer interface, complemented by the teacher's vocal narration. The shape of one of the films released by iTuition Indo is depicted in Figure 1. The video content provided by iTuition Indo is highly commendable as a valuable educational resource for students. The video has a high level of clarity in its image quality. The instructor's vocal delivery was articulate and comprehensible. The pedagogical approach employed by the teacher involves assigning distinct colors to each written component, facilitating comprehension of the instructional content among students.

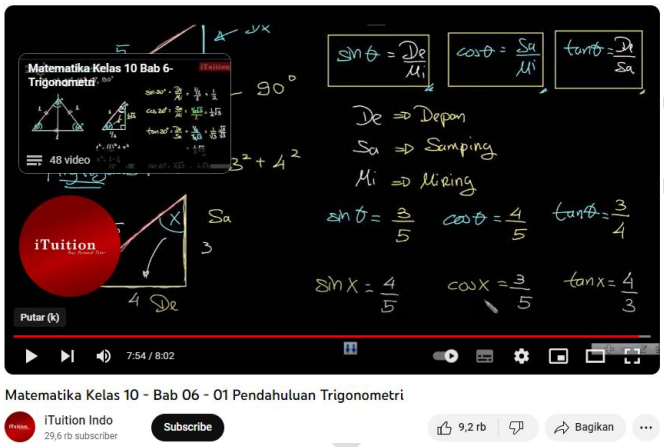


**Fig. 1.One of the videos uploaded by iTuition Indo**

### 3.2Matematika Hebat YouTube channel

The YouTube channel known as "Matematika Hebat" is dedicated to providing educational content focused on the subject of mathematics. The channel belonging to Matematika Hebat can be conveniently reached on the Internet by utilising the following link: https://www.youtube.com/@Matematika_Hebat/videos. The channel curated by Matematika Hebat offers educational content on mathematics spanning from primary to secondary education levels. The organisation of video content on this channel is suboptimal. The categorization of movies is lacking in organisation, hence posing challenges in locating educational videos that align with the requirements of pupils. Matematika Hebat channel features a collection of instructional videos pertaining to primary school mathematics. The video showcases innovative methods for facilitating children's acquisition of numerical skills. There exists a limited number of educational videos specifically designed for middle school students. Matematika Hebat selectively uploads content from specific sub-chapters, resulting in an incomplete representation of the material. The video does not provide any further elaboration on the subject matter. Matematika Hebat has uploaded a substantial number of videos, over two thousand in total. Consequently, students may have challenges in discerning the availability of specific video content on this particular channel. In addition to this, educational videos designed for high school pupils and their counterparts encompass

comprehensive elucidations on problem-solving methodologies.The instructor provides inquiries that align with the content covered in the National Examination material, and subsequently elucidates strategies for effectively tackling these queries. Each video consists of the instructor's elucidation of mathematical learning material, utilising white paper and coloured markers to illustrate the lesson, backed by the instructor's vocal narration. The below content is the structure of a video that has been posted by Matematika Hebat. Figure 2 depicts a video that has been uploaded by Matematika Hebat. The video content provided by Matematika Hebat is deemed satisfactory as an educational resource for students. The visual clarity of the presented imagery in the video is satisfactory, but upon juxtaposing it with the video uploaded by iTuition Indo, it becomes evident that the latter exhibits superior image quality. The clarity of the teacher's voice throughout the explanations is noteworthy. The pedagogical approach employed by the teacher involves assigning distinct colors to individual pieces of writing, thereby facilitating comprehension of the instructional content among students.

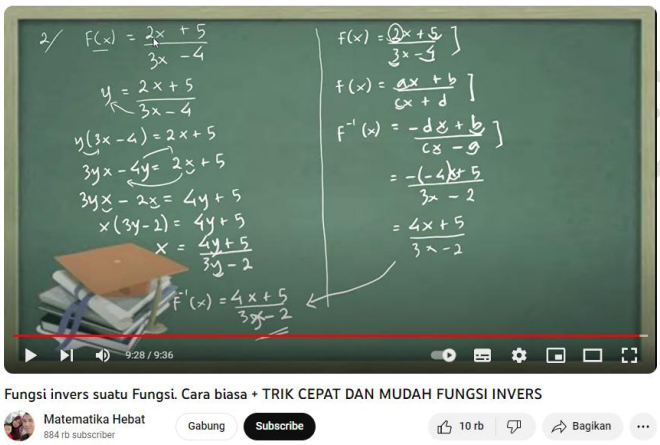


**Fig.2.One of the videos uploaded by Matematika Hebat**

### 3.3kafe math YouTube channel

The kafe math channel is a dedicated platform that exclusively shares educational films focused on the subject of mathematics. The channel in question can be reached by utilising the above hyperlink: https://www.youtube.com/@kafemath03/videos, but I need more information or context in order to provide an academic rewrite In comparison to the established iTuition Indo and Matematika Hebat channels, the kafe math learning channel is rather nascent. The inaugural video of this channel was uploaded in the year 2018. The content provided is up-to-date and aligns with the curriculum established in 2013. The videos provided by the Complete and consecutive Mathematics Learning Channel are meticulously organised and presented in a consecutive manner. The Learning Channel known as kafe math commences each chapter of uploaded material with an introductory section that provides an overview of the content. The introduction encompasses a visual representation, in the form of a concept map, of the content covered within the chapters and sub-chapters of the material. The subsequent video corresponds to the initial subchapter inside the chapter, and this pattern continues until all the content has been addressed. The video title also highlights the significance of the video description, which includes links to all sub-chapter videos within the topic.This feature facilitates comprehensive studying of the material for

students. Regrettably, the content provided by the Complete and Ordered Mathematics Learning Channel just comprises mathematics material that is exclusively tailored for the field of Mathematics and Natural Sciences (MIPA). Specifically, the material focuses on two topics: (1) exponents and logarithms, and (2) polynomials. It is plausible that the kafe math channel may produce additional video content in the future, as this channel is now in its early stages of development. Each video consists of the instructor providing an explanation of mathematical learning material, utilising lined paper that has been initially inscribed with a pen. The instructor elucidates the educational content while providing auditory support. Figure 3 depicts a video that has been uploaded by the kafe math channel. The educational content presented in the videos produced by kafe math is of high quality and serves as a valuable resource for students seeking to enhance their learning experience. The investigation reveals that the channels examined exhibit varying levels of image quality, with the highest quality observed in the channel under consideration. The clarity of the teacher's explanation is also evident in their vocal delivery. The pedagogical approach employed by the instructor is commendable, despite the preexisting nature of the instructional material. The comprehensive elucidation of the subject matter is commendable.

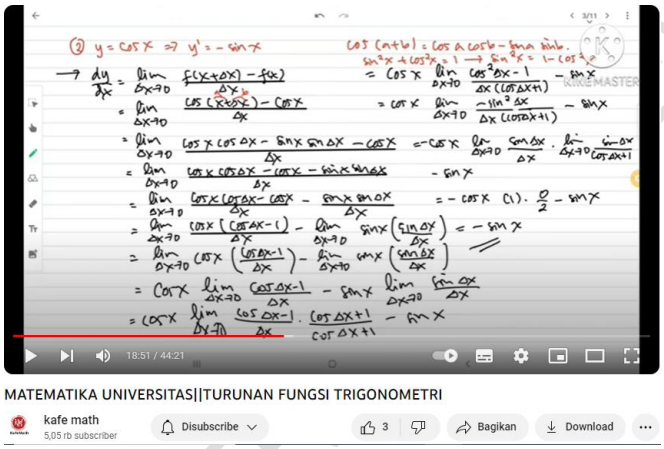


**Fig.3.One of the videos uploaded by kafe math**

### 3.4YouTube as a Mathematics Learning Resource

YouTube is a frequently utilised educational tool by numerous educational institutions and universities internationally. Nevertheless, a limitation of this particular channel is in the fact that it does not encompass the entirety of mathematical learning materials. In order to access the desired educational content, students are required to utilise the YouTube search engine to locate instructional videos that align with their expectations. In order to effectively utilise YouTube as an educational tool, as suggested by [25], one can follow a series of steps. Firstly, access the website www.youtube.com through an internet browser. Secondly, utilise the search bar located at the top of the page to input relevant keywords, titles, or terms that pertain to the desired video. Lastly, initiate the search process by clicking on the designated "search" button. The internet browser's screen will exhibit a compilation of video titles accompanied by screenshots of videos that satisfy the specified criteria for the desired video. The keywords that have been inputted. To choose a video based on the required subject, users can select the video by clicking on the corresponding screenshot. The designated video will be executed. At the lower section of the video interface, there are

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many functionalities available to the user, including the ability to pause, rewind, fast forward, expand the video display, and alter the audio volume. Additionally, the interface includes a metre that indicates the duration of the film.Furthermore, upon completion of the video, users are presented with the choice to either proceed to another video or replay the current one. In addition to the main video, YouTube also presents users with titles and screenshots of other videos that have similar material. Users have the option to save the video directly on the YouTube platform by adding it to their "Favourites" or "Add to Playlist" feature. Alternatively, users can copy the video's URL from the navigation box and utilise it elsewhere. In order to enhance the use of the links within an educational setting, users have the option to obtain supplementary information pertaining to video viewing and other functionalities on YouTube by selecting the "Help" hyperlink. According to a review of YouTube channels, it is evident that YouTube possesses the potential to serve as a valuable platform for mathematics education. In order to validate this assertion, a series of interviews were carried out with mathematics educators and students enrolled in secondary education. None of the mathematics teachers who participated in this study had previously utilised YouTube as a resource for maths education. In the study, it was found that 30% of the participating students utilised YouTube as a means of acquiring knowledge in the field of mathematics. However, it is worth noting that participants inadvertently stumbled into mathematics learning videos on YouTube while utilising the platform as a source for learning mathematics. Students utilise the Google search engine to seek for relevant material, subsequently employing YouTube as a platform to locate videos that align with their specific preferences. The utilisation of YouTube as a mathematical learning resource was also subject to scrutiny and evaluation by maths educators. The utilisation of YouTube as an educational tool yields both advantageous and unfavourable consequences. One advantage of utilising YouTube as a learning resource for students is its ability to engage students through the use of video content, as opposed to traditional text-based resources. Additionally, YouTube offers the flexibility for students to explore alternative subjects or topics when they become disinterested or fatigued with their current studies, providing a refreshing break from their primary focus on mathematics. One can enhance their knowledge and skills by engaging in video-based learning. Videos of amusement on the YouTube platform. In contrast, YouTube's use as a student learning resource is accompanied by certain adverse effects. Firstly, the presence of videos that lack educational value might serve as a source of distraction for students while engaging with mathematical content on the platform. Secondly, YouTube may not be conducive to the learning preferences of individuals who adhere to more traditional or conventional approaches to education. The mathematics instructor, who served as the focal point of this study, proposed the creation of a YouTube channel that offers comprehensive and structured mathematical instruction aligned with the existing curriculum. By utilising a platform of this nature, educators have the ability to access and retrieve the films hosted on said platform, subsequently disseminating them among their students. This approach serves to mitigate the adverse consequences associated with the use of YouTube. The participants in this study held the belief that YouTube has the potential to serve as a valuable educational tool for mathematics, provided that teachers provide guidance on which videos should be utilised as instructional resources for pupils. Many students have a sense of confusion when confronted with the abundance of films available on the YouTube platform. Occasionally, students may encounter instances where the video title they desire does not align with the actual content of the video. The presence of the teacher is important in effectively leveraging YouTube as an educational tool. Educators possess the ability to categorise movies and then inform students of the availability of videos that may serve as valuable educational materials.

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## 4. CONCLUSION

Based on the findings and subsequent analysis, it can be inferred that YouTube channels offering mathematics instruction possess the potential to serve as a valuable educational tool for pupils. Nevertheless, of the several channels utilised for research purposes, none can be considered an exhaustive resource for acquiring comprehensive knowledge in mathematics. YouTube has the ability to serve as a viable platform for mathematics education, despite its various detrimental effects.

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